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Frameworks and Measurement of Gambling Related Harm: A Scoping Study

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1 Executive Summary

Gambling is increasingly framed from a public health perspective, aligning it with trends for tobacco, drugs and alcohol. As an approach that emphasises reduction or prevention of harms right across the population, it requires a strong understanding of how harms arise and who they affect.

We therefore conducted this short scoping study to understand developments in the conceptualisation and measurement of Gambling Related Harms (GRH). Our goal was to appraise existing frameworks and measurement approaches, and thereby inform future research, prevention and intervention strategies.

Our approach involved a rapid structured literature review, alongside Subject Matter Expert workshops, supporting our appraisal by incorporating a variety of lived experiences and stakeholder perspectives.

1.1 Frameworks for Gambling Related Harms

Over the last ten years, several frameworks for conceptualising GRH have been developed. Each of these has slightly different aims and emphases, although they have more similarities than differences.

Overall, the harms described in the frameworks are categorised according to several domains – financial, relationship, physical, psychological, social and cultural, work/study, crime – and have spectrums of severity that range from common, low-impact harms, through to crises and ongoing, legacy, and intergenerational harms. These frameworks also recognise the wider impact of GRH on friends and family of the individual gambling (i.e., affected others), their community and broader society.

From these frameworks, the 'Conceptual Framework of Gambling Related Harms' of Langham *et al.* represents the most comprehensive and robustly developed; underpinned by literature reviews alongside systematic engagement with people with lived experience, affected others, and professionals. As such, the framework largely fulfils modern scientific criteria (defined in established standards for "content development") for the subsequent development of self-report tools to measure GRH.

The Langham (and other) frameworks were endorsed as understandable and comprehensive by our workshops of Subject Matter Experts, although we identified some areas for development. These included more lived experience input of how harms manifest in the UK context (which is likely to differ from North America and Australia); the role of ethnicity and gender in mediating harms; the role of stigma in both generating and compounding harms; a more nuanced perspective on affected others; and the impacts at different developmental stages for children and young people. Moreover, our work identified a need for purpose-designed and validated gambling recovery frameworks (analogous to those used in mental health services, and intended for harm reduction interventions such as counselling).

We also investigated frameworks from the adjacent sectors of alcohol and drug harm reduction which highlighted the consequences of policy action (both intentional and unintentional), and how regulatory choices involve complicated trade-offs amongst competing goals and socio-political viewpoints.

1.2 Measurement Approaches for Gambling Related Harms

Established measures such as the Problem Gambling Severity Index (PGSI) and South Oaks Gambling Screen have several shortcomings. Developed several decades ago, they were not developed using modern protocols for aspects such as lived experience input; now considered essential elements for the development of self-report measurement tools. Moreover, they lack any robust underlying theoretical frameworks of harm. Instead, they are largely predicated on clinically-derived notions of 'pathological' versus 'non-pathological' gambling. As a result, the questions (or "items") in the PGSI combine risk factors (i.e., behaviours) and outcomes (i.e. the harms themselves). Definitions of 'problem gambler' are thereby derived from an ambiguous, ill-defined mix of risk factors and outcomes, and are inappropriate proxies of harm.

Within our results, we graphically map items from scales such as the PGSI against the Langham framework of harm, helping illustrate how the various items are ambiguously related to harm, ill-defined as harms, or only imply harm. Finally, it is now recognised that entrenched use of such "problem gambler" terminology within research, public health and non-governmental organisations unwittingly places blame directly on individuals, and thereby contributes to the stigmatisation and exacerbation of gambling harms. Overall, these observations highlight that tools such as the PGSI are conceptually weak representations of gambling harms. A new generation of tools is required.

In contrast, the Langham framework has enabled the development of an 'item bank' of questions, mapping right across the domains of harm. From this, a new suite of 'Short Gambling Harms Screens' (SGHS) tools have been developed, aimed at people who gamble or affected others. It has also underpinned the recent addition of specific harms items into the upcoming Gambling Survey for Great Britain, delivered by the Gambling Commission. These new tools are better able to identify reductions in quality of life and provide more specific and precise measures of harm.

The benefits of using these tools can already be observed: for example, in supporting the idea of the 'prevention paradox', where most harms are attributable to those with lower risks of gambling problems (as they are a far more populous group), rather than the small minority with more serious gambling harms. This justifies broad public health campaigns rather than a focus on people experiencing 'problem gambling'. Furthermore, research indicates that there are commonalities between harms experienced by people who gamble and those around them, where affected others experience perhaps half the aggregate harms as people who gamble themselves. Furthermore, such harms persist long after any underlying behaviours have changed.

Health economic methods directly align gambling with other public health and harm reduction initiatives i.e. interventions designed to reduce mutable harms associated with an activity or phenomenon without seeking to reduce that activity *per se*. They estimate the reduction in

health-related quality of life from gambling harms using methodologies deployed in various global 'burden of disease' studies, where it has been established that serious gambling harms may be comparable to major depressive disorder and alcohol dependence. "Indirect elicitation" is now the preferred method, where measures of harm are standardised to quality of life questionnaires, so that increases in harm (measured by the SGHS) can be equated with reductions in quality of life.

The increasing use of health economic approaches will integrate GRH reduction with public health processes, protocols, and initiatives. It will enable standardised approaches to be used in intervention and service evaluations, ensuring that they provide value for money.

1.3 Recommendations for Future Research

The last decade has seen substantial developments in the conceptualisation and measurement of GRH, providing new perspectives that move beyond entrenched and clinically-derived definitions for gambling. A continued move towards public health paradigms will require continued support for the development of underlying tools and expertise. We suggest a series of next steps, primarily:

Next steps for frameworks of GRH:

- **Further research is needed** to supplement existing frameworks, so that they fully represent the harms experienced by specific cohorts and sub-groups. This should incorporate: the harms experienced across different ages of children and young people (where the only existing framework specifically for young people has a limited and pragmatic scope) ; the nuanced perspectives of various affected others; the impacts of stigma; and the specifics of the GB context (which is GambleAware's mandate), including its ethnic, cultural and policy context;

- Our work with Subject Matter Experts highlighted a need for **specific recovery frameworks for GRH** (which are validated and published, rather than ad-hoc "in house" tools), analogous to those used in mental health services which can be used simultaneously as a treatment tool, for monitoring individual recovery, and for service-level evaluation through data aggregation;

- Any **new findings concerning gambling harms should be integrated into an iterative, ongoing framework**, aligned with current scientific trends towards 'open science' approaches. This would enable the evolving evidence base to be systematically integrated into ongoing developments in the measurement of harms;

- A **more thorough appraisal of gambling harms via a socio-political lens should be undertaken**. Research from adjacent sectors (drugs in particular), has highlighted the importance of policy, and how choices around prohibition and regulation involve complicated trade-offs amongst competing goals and socio-political viewpoints. Here, neo-liberal societies have been highlighted as liable to 'victim blame', where stigmatisation of gambling harms are exacerbated by the focus on individual responsibility and clinical definitions. **Research should be open, aware and**

transparent about the preferences and potential biases of the paradigm in which it operates.

Recommendations for the measurement of GRH:

- **New modes of GRH measurement are needed**. The field should move away from anachronistic measurement tools that conflate harms and behaviours, which are often used to produce often binary and stigmatising "problem gambler" labels onto individuals. New measurement approaches should be used, which are now predicated on robust frameworks of harm, such as the SGHS or newly designed harms items that are being deployed in the upcoming Gambling Survey for Great Britain, delivered by the Gambling Commission;

- **This proliferation of harms measurement approaches needs to be rationalised** using standardised statistical approaches, where different harms scales can all be used to produce a single 'harm index'. Here, Item Response Theory should be used to integrate various results into a single continuum of severity, and even provide backwards compatibility with historic measurements such as the PGSI. This 'harm index' or 'harm scale' could act as a replacement for PGSI scores, used for monitoring the level of harm encountered in everything from individuals right through to whole populations;

- Any **future harm index should also be linked to decrements in quality of life arising from such harms**. This will align gambling with other public health economic approaches, enabling cost-effective targeting of interventions for the highest overall impact on quality of life;

- Item Response Theory approaches have additional benefits, and will enable **a 'Computer Adaptive Test', for efficient harms measurement on devices such as phones and tablets.** This will provide a more precise 'harm score' for an individual, but with fewer questions, having the ability to "zoom in" (when appropriate) to rarely studied, higher severity and legacy impacts such as bankruptcy, job loss and relationship breakdown. This will enable more precise measurement, with benefits for research and harm reduction strategies.

When concepts shift, measurement approaches need updating. By building future measurements upon robust conceptualisations of harm, and then linking these to reductions in quality of life, GRH will be integrated with other public health initiatives. It will enable the field to pivot away from historic definitions of 'problem gamblers', where such clinical notions of individual responsibility are liable to be a stigmatising driver of harm. Ultimately, this will improve the accuracy and utility of future measurement of gambling harms.

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2 Introduction

"The way you define a problem will determine what you do about it."

Dr Jonathan Mann*,
architect of the first WHO public health AIDS programme.

Ever since the 1999 publication, '*Gambling and the health of the public: adopting a public health perspective*'[1] (Korn and Shaffer), a public health model for gambling has gained momentum[2–5] globally. This approach emphasises the importance of reduction and prevention of harms across the population. This shift brings gambling into closer alignment with earlier trends in harm prevention for tobacco, drugs and alcohol, where public health approaches were developed some years previous[6–8].

The public health approach requires clarity on how harms manifest and who is affected. With gambling, early work primarily focused on framing and defining the public health issue[5,9]. Over the last decade, however, there has been increasingly advanced frameworking around the various dimensions of harm – financial, psychological, relationship, health, cultural, work/study, crime – which has helped recognise that harms do not simply involve excessive gambling from a minority of people who gamble, but can also manifest at a lower level across a far larger number of individuals[10–12].

This shifting public health emphasis contrasts with earlier paradigms of gambling harm, which often framed gambling within clinical (and often binary) definitions of 'non-problematic' versus 'problematic', which often focused only on the individual, thus ignoring harms across the population (and their patterns). Gambling problems were largely perceived as an individual problem to be treated with clinical solutions, equivalent to the conceptualisation of biomedical disease[5,13].

It was within such a context that frequently used measurement and screening tools such as the 'Problem Gambling Severity Index' (PGSI) were developed. Recent commentary has suggested[5,11,14–16] that such tools are becoming outdated, and are not readily aligned with public health and harm reduction strategies aimed at changing behaviours across the population, such as educational campaigns[5,11,14–16]. The questions within the PGSI often conflate behaviours (such as uncontrolled gambling) with outcomes (the harms themselves), with no recourse to any conceptual distinction.

When concepts shift, measurement approaches need updating. With gambling, recent research has seen an increased focus on explicit concepts, definitions and measurement of harms[11,14,17–19].

*As quoted by Kofi Annan, May 2001.
http://unis.unvienna.org/unis/en/pressrels/2001/sgsm7826.html

With a public health approach now increasingly embedded across research, service provision and prevention, GambleAware is aware that a diversity of disparate approaches are being internationally developed around the conceptualisation and measurement of Gambling Related Harms (GRH). We therefore conducted this scoping study, aiming to synthesise and assess various disparate strands of GRH frameworks and measurement, to appraise and rationalise recent work to inform future research, prevention, and intervention.

Aims of the study

The scoping review had three key aims, detailed below:

1. **Appraise frameworks of GRH.** This involved literature searches for frameworks of harm, followed by a critical appraisal and comparison of the frameworks, including engagement with Subject Matter Experts to highlight potential shortcomings and limitations. Additionally, we identified harms frameworks from the drugs and alcohol literature, to help identify any lessons from adjacent sectors.
   Research questions included:
   - What are the existing frameworks of gambling harms?
   - What are their strengths, limitations, and gaps?

2. **Appraising various approaches for measuring GRH.** Tools were identified via literature searches, snowballing and expert input. These were critically appraised (including expert feedback) and juxtaposed against the various frameworks of harm, helping elucidate the various strengths, limitations, and gaps.
   Research questions included:
   - What are the existing gambling screening tools used in surveys, frontline services and/or other areas?
   - What are their strengths and weaknesses?
   - How does the risk and/or experience of harm vary in existing gambling screens at the various thresholds used by those screens?
   - At what point are the harms known to be experienced?
   - What are the key frameworks and measurement scales of harms in adjacent sectors?

3. **Recommendations for future frameworks and measurement of GRH.** The scoping review aimed to discuss whether new (or extended) conceptualisations were needed; recommendations for future measurement; and whether new treatment outcomes measures were needed for GRH.
   Research questions included:
   - What are the key areas for the development of a comprehensive gambling harms framework?
   - To what extent are new treatment outcome measures needed for gambling harms?

Our results comprise two major sections: one for frameworks of harm, one for measurements of harm. Within the first section of results (primarily addressing Aim 1 above) we first discuss frameworks for GRH before summarising frameworks from adjacent sectors. This is followed by

a summary of the relevant findings from our Subject Matter Expert workshops, where the various frameworks were appraised.

In the second section of results (primarily addressing Aim 2 above), we discuss measurement of GRHs, starting with historic instruments such as the PGSI, before moving onto a new generation of instruments designed to specifically measure gambling harms. For these various instruments, we undertook a novel exercise of 'item mapping', where the items from each instrument were mapped against a framework of harm, thus elucidating the strengths, weaknesses and gaps in existing measurement approaches. At the end of this section on measurement, we summarise the key relevant findings from our Subject Matter Expert workshops, where these various measurement approaches were appraised.

Finally, in the discussion (largely addressing Aim 3), results are synthesised to produce a number of specific recommendations for the ongoing development of frameworks and measurement of GRHs.

3 Methodology

3.1 Overview

This project involved a scoping review integrated with targeted Subject Matter Expert engagement. Scoping reviews deploy systematic approaches to efficiently appraise diverse literature, identify knowledge gaps, and help inform future research strategies[20,21]. The scoping review was conducted using a rapid review methodology, explained below. Figure 1 illustrates the search and screening process, detailing the number of studies at each stage.

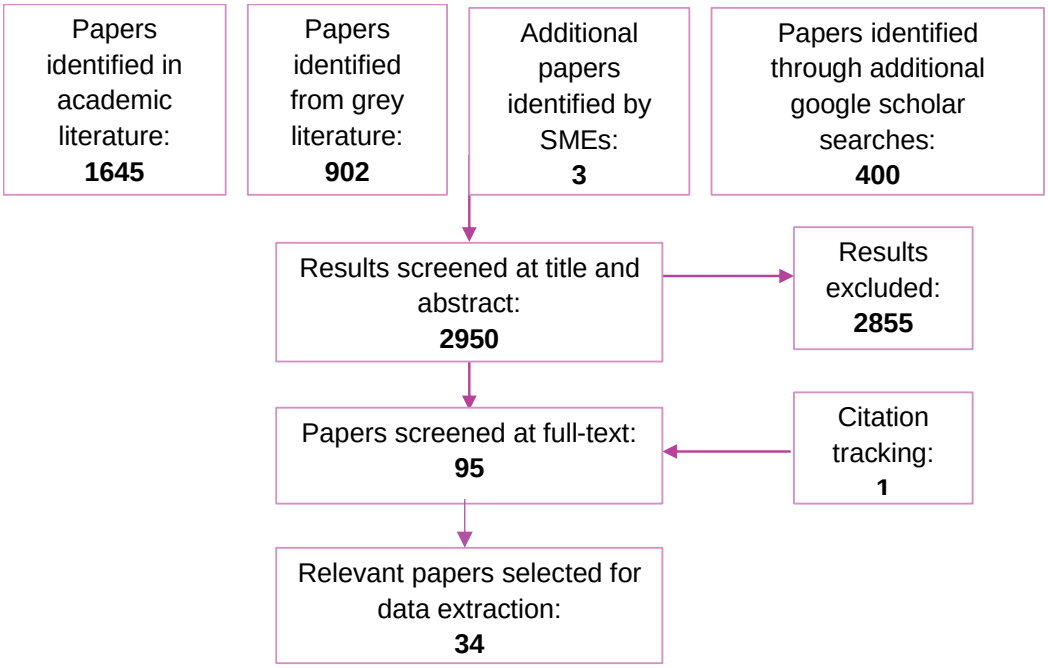

Figure 1: Flowchart of evidence identification, screening, and selection.

3.2 Evidence Identification

Evidence identification involved a systematic search of both academic and grey literature. The search strategy was developed with the input of GambleAware and an information scientist and piloted on PubMed (see Appendix A.2). Searches were conducted on Medline, Scopus, PsychInfo and Sociological Abstracts. Search strings were developed in relation to the inclusion and exclusion criteria (Appendix A.1). Grey literature searches were conducted using a list of websites identified by the research team as relevant to the research questions (i.e., gambling-related organisations and charities; Appendix A.3) and searched using a set of similar core search terms, albeit adopting a flexible approach due to the differing search capabilities of each website (e.g., allowing dates, filters, Boolean search terms, etc.). Once the list of papers was finalised, Subject Matter Experts (see below) were asked to identify any relevant papers that

had been missed. This identified a further 3 papers. From our finalised list of “core” references (see section 3.4 below), we also employed backward citation tracking (i.e., from the references list) and forward citation tracking (i.e., later work that had cited these publications). This identified 1 further paper.

3.3 Evidence screening and selection

Academic and grey literature was screened at two stages: (1) title and abstract, and (2) full-text. The screening was conducted via the online platform Covidence, designed for systematic reviews. Following the searches above, title and abstracts of all papers were screened against the inclusion and exclusion criteria (Appendix A.1 for full details). Any papers where inclusion/exclusion was unclear were discussed among the research team and ambiguities resolved. All papers appearing to meet the criteria were included for full-text review. In total, 2950 papers were screened at title and abstract level, with 2855 papers excluded.

All papers identified for full-text screening were reviewed using a full-text screening tool uploaded to Covidence (see Appendix A.4). This tool included two elements:

- To assess relevance, papers were scored according to their relevance to the research questions. We also recorded information such as study type, year, evidence type and if applicable name of framework(s) or measure(s);
- Secondly, papers were scored against a Weight of Evidence tool to assess their methodological quality. The Weight of Evidence tool is based on the approach developed by the EPPI-Centre (Evidence for Policy and Practice Information and Coordinating Centre) and has been applied in the analysis of both quantitative and qualitative-based research[22].

As a result, each paper was evaluated based on relevance and robustness, while also mapping the evidence thematically and methodologically. A total of 95 papers were screened at full-text level. Following the scoring, 34 of the highest rating papers were selected for data extraction. Of the low scoring papers which were excluded, many did not explicitly discuss a harms framework or harms measurement tool, or used harms measurement tools without discussing them. Other papers were excluded because they were duplications or there were concerns about the weight of evidence (for example a conflict of interest related to funding).This number was pre-agreed with GambleAware, and whilst this work was limited by time and resources, our approach aimed to target the most relevant publications. Core references are highlighted in bold in the reference list.

3.4 Data extraction

A data extraction tool was developed to enable narrative synthesis and critical appraisal of existing frameworks and measures of harm. The full data extraction tool is included in Appendix A.5. Members of the research team read papers closely and extracted relevant information into the extraction framework. Data was organised into key descriptive and conceptual themes including descriptions of frameworks and measures of harms, strengths and limitations and gaps.

3.5 Mapping measurement tools against the frameworks of harm

As an additional exercise to the literature reviews and evidence appraisal, we mapped a variety of identified measurement tools against a conceptual framework of harm. The aim was to identify potential gaps and limitations with existing measurement approaches. From our evidence appraisal (see the first stage of results, below), we identified the Langham 'Conceptual Framework of Gambling Related Harms' as the most robustly developed, complete, and influential framework (based on its methodological alignment with modern scientific protocols[23,24] and citation impact of publications). We therefore utilised this as a substrate for our mapping exercise, where items from each instrument were categorised according to the seven-dimension harm schema of the framework (financial; relationship; psychological; health; cultural; work/study; crime). However, we expanded this framework to include categories for "opportunity costs" and "benefits", thus incorporating recognised limitations of the Langham Framework[25] and elements from other frameworks[26]. Additionally, we also include a "severity" scale, along the right-hand side. Here, each item was (where possible) mapped against a 72-item checklist of harms[27], derived from the Langham framework. Due to the existence of previously published Item Response Theory analysis, each checklist item has a numerical "severity" rating on a logit scale (normally referred to as "item difficulty", in Item Response Theory parlance). See Appendix C for our underlying Item Response Theory mapping for the diagrams, which is derived from previously published work[27]. On our diagrams, the severity scale (which runs from 0-1) is for indicative purposes only.

Our placement of "opportunity costs" at lower than zero and "crises" at higher than two is somewhat subjective but is supported by Item Response Theory scores of the underlying harms (see underlying data; Appendix C). Many items could not be mapped directly against the 72-item checklist or had non-specific wording (i.e., conflated several harms within a single item), and we have instead made a rational placement along the scale (driven by logical principles and expert knowledge of gambling harms literature); please refer to the underlying data. Due to the heterogeneity of the underlying measurement approaches, this is reflected in some nuances in the representation of each measurement approach: these differences are explained within each figure legend.

3.6 Subject Matter Expert engagement

The core approach of this work was the scoping review, outlined above. However, to enable synthesis, discussion, and recommendations to reflect the perspectives of multiple stakeholders, we also conducted a brief and pragmatic expert engagement exercise. These Subject Matter Experts served as key respondents who represented the perspectives of various organisations, communities and expertise, thus appraising our preliminary findings from these multiple perspectives. This process involved a range of experts, namely:

- 3 participants from UK gambling support charities, with a background in prevention and treatment;
- 1 international expert on harm reduction, drug prevention and intervention, and community capacity building;
- 1 academic with a background in drugs and gambling research and policy;

- 1 academic expert on gambling harms measurement;
- 1 participant from UK gambling charity with expertise on equity, diversity and inclusion;
- 2 lived experience experts on GRHs.

We obtained informed consent from all participants, with ethical approval provided by NatCen's Research Ethics Committee. The ethical risks were deemed minimal (despite involvement of those with lived experience), due to a lack of stigmatising language within the subject matter and discussions around gambling harms being abstracted and general (rather than personal). All participants also had previous experience with research processes and protocols.

All participants were offered a gift voucher for participation. Expert engagement primarily involved two 2-hour workshops, each comprising a balanced representation of the above experts. Prior to the workshop, experts were provided with a PowerPoint presentation with preliminary findings, in a lay-friendly format. This provided participants with time to consider findings, and study the measurement approaches and frameworks, looking to identify any gaps or omissions from their perspective.

During the workshops, overall findings from the scoping review and analysis were presented and discussed, with group discussions focusing on (A) identified frameworks of harm and (B) identified measurement approaches for harm. Participants were invited to discuss gaps and omissions; utility and applicability for their context; and most useful "next steps".

Due to the scoping nature of this work, in-depth qualitative analysis was not feasible. Instead, field-notes were collated by an observing researcher, with notes later cross-referenced against automated transcription, with key themes summarised in a rapid thematic analysis approach[28].

3.8 Relationship to other previous reviews

It was observed that there were a number of recent reviews that partially overlapped with the aims of our work. The recent review *Frameworks of gambling harms: a comparative review and synthesis*[4] conducted a systematic literature review for existing gambling harms frameworks (where these results corroborated the harms frameworks we identified). The review *Charting a path towards a public health approach for gambling harm prevention*[5] provides a historical perspective on how the public health model has evolved for gambling harm, leading up to the same frameworks of harm identified in our work. Similarly, a review by Public Health England, *Harms associated with gambling – An abbreviated systematic review*[19] (which was pre-registered[29]), aimed to review the harms associated with gambling, and thereby augmented and overlapped with the existing framework of harms.

In contrast, *The Evolution of Gambling-Related Harm Measurement: Lessons from the Last Decade*[11] also overlapped with our work, but with this review instead limited to gambling harms measurement tools. Due to the comprehensiveness of this work, our review avoided repeating such a forensic and detailed review of all the various harms measurement tools. Instead, this previous work should stand as a comprehensive reference, which includes details on a far broader range of harms measurement tools, such as the Victorian Gambling Screen (VGS), the Problem and Pathological Gambling Measure (PPGM), and a variety of one-off, standalone approaches.

When compared to these previous reviews, the aims and scope of our work took a rather broader perspective; synthesising and contrasting findings from across *both* frameworks and measurement approaches. We investigated frameworks from adjacent sectors (i.e. drugs and alcohol); critically appraised frameworks and measurement tools (including expert feedback); and also juxtaposed measurement tools against various frameworks of harm (i.e. using the above "mapping" exercise). In this way, our work encompassed and augmented the more limited focus of previous work, thus enabling us to make a broader series of recommendations for future work.

3.7 Limitations

There were a number of limitations with our methodological approach. Through deploying a pragmatic, rapid review approach, we were limited to full-text review on a pre-agreed number of publications. Nonetheless, other references (where necessary) were also incorporated into our overall findings, with SME engagement acting as a "safety net" to ensure that relevant literature was not overlooked. Due to the existence of a previous review on measurement of gambling harms[11] (see above section), we avoided producing another comprehensive review of measurement approaches, and instead took the pragmatic approach of appraising a small number of representative and well used tools, both historic (i.e. PGSI and the South Oaks Gambling Screen) and modern (i.e. SGHS and the recent items included in the upcoming Gambling Commission annual survey) The mapping exercise should be interpreted as indicative only, although it does help visualise some of the gaps and limitations with existing harm measurement. Our SME workshops, involving a total of 9 participants, were a pragmatic approach to appraising our findings from various perspectives. The absence of participants from a policy or commissioning perspective is noted and other perspectives on GRH may have offered other novel insights.

4 Results

Our literature search strategy was developed with the aim of identifying: (1) frameworks for GRHs and frameworks of harm from adjacent sectors (e.g., drugs and alcohol); and (2) tools for the measurement of GRH. Results for each of these is discussed in separate sub-sections below.

Overall, we identified 34 publications that were prioritised for data extraction (see papers indicated in bold in the references). As a scoping project, this shortlist is not a fully comprehensive appraisal, but instead represents a targeted investigation of key literature. This involved screening a long-list of 2,950 publications at abstract level, which identified 95 publications for full-text screening (see Figure 1, in Chapter 3, for a flow diagram of the screening process). These were screened using a systematic approach for both relevance and methodological quality, enabling us to prioritise 34 publications that align closely with the aims of our scoping review.

Of these 34 papers, 28 included evidence about gambling, 4 included evidence about drug use and 2 included evidence about alcohol use. With regard to frameworks and measurement, 14 related only to frameworks of harm, 13 related only to measures of harm and 7 papers included evidence about both frameworks and measures of harm.

These 'core texts' (bolded in the reference list) were subjected to detailed data extraction by the research team, with the results informing our narrative appraisal below. However, relevant publications beyond these core texts were also appraised, although these publications tend to be limited to specific elements of the overall findings.

4.1 Frameworks for Gambling Related Harm

Overall, we identified 5 frameworks of GRH (see Table 1), all developed over the last decade. Whilst there are substantial overlaps and similarities between these frameworks, each have different underlying aims and emphases. Despite different countries of origin, all the models have a somewhat international scope and applicability. Due to the similar names of the frameworks[†], in this document, we normally refer to the first author when discussing the frameworks (Table 1; first column). The frameworks are discussed chronologically below.

[†]The framework names are often confusingly similar: e.g. the "Conceptual Framework of Harmful Gambling (CFHG)" versus the "Conceptual Framework of Gambling Related Harms (CFGRH)".

Table 1. Frameworks of GRH (top panel; pink) and from related disciplines (bottom panel; turquoise).

First Author and Framework	Country	Year	Long Title / Publication	Overview	Development Process	Strengths	Limitations
Gambling Frameworks							
Abbott / GREO Framework	Canada	3 Editions: First 2013 Second 2015 Third 2018	The Conceptual Framework of Harmful Gambling (CFHG) Latest edition: (Abbott et al. 2018)	Framework is primarily a summary of factors driving GRH, which aims to be a comprehensive view that spans countries, cultures, and scientific disciplines. Synthesises findings across gambling domains (gambling types; environment; resources; exposure) and general domains (cultural; psychological; social; biological). Domains assessed at the individual, family, and community level). The Australian/Langham framework (below) is cited as a complementary framework.	Created by international and interdisciplinary experts from a variety of perspectives (researchers, treatment providers, operators, policy makers, individuals, and their families). However, no explicit methodological approach outlined. Essentially an expert narrative review, with expert opinions interlaced.	Broadens focus from 'problem gambling', beyond to family, social networks etc. Consistent with a public health approach and social model of health. Highlights areas where knowledge is robust and where it is not. Regularly updated. Considers costs and benefits to gambler, family, community, and society; recognises complexity and diversity of contributing factors; considers temporality of harm (episodic, chronic).	More a conceptual model of *inputs and drivers* of GRH; doesn't really address the manifestations of those harms. Framework limited by dominance of psychological research at the individual level; more research needed of GRH that examines contributing factors at family, community, and population level. Similarly, the benefits are largely hypothetical due to limited evidence base.

First Author and Framework	Country	Year	Long Title / Publication	Overview	Development Process	Strengths	Limitations
Langham / CQU Framework	Australia	2016	Conceptual Framework of Gambling Related Harms (Langham et al. 2016)	Complementary to the Abbot / GREO framework above: this framework focuses on the impacts (rather than drivers) of GRH Harms are organised into 7 categories: financial, relationship, emotional or psychological, health, work study or economic activity, criminal and cultural. Has temporal dimension of crisis, legacy or life course/intergenerational.	Robust development process: Literature reviews, professional focus groups, lived experience interviews (including affected others), analysis of forums. Documented methodological approach. Largely fulfils scientific criteria for a scientific 'taxonomy'.	Considers broad range of subjects - individuals, families, communities, and populations. Distinguishes between different severity level of harms. Considers temporality of harm including legacy harm and life course/ intergenerational harm. Most robustly developed framework. Can be used to develop summary measures, such as health-related quality of life weightings of the overall impact of GRH on population health.	Does not establish causation (harms could be due to other behavioural choices or comorbidities). Only cause of harm considered is engagement with gambling.
Wardle / Framework for Action	UK	2018	Measuring gambling-related harms: A Framework for Action (Wardle et al. 2018)	Taking a public health approach, aimed to estimate costs of GRH; identified 50 different metrics of GRH under three categories: resources: money and debt, work / employment, crime, relationships: family, friends and community and health: physical, psychological, and mental health. The model also presents 4 levels that harm may	Pragmatic approach, drawing on literature reviews and a range of experts. No explicit method, beyond expert input focus groups.	Considers broad range of harms and temporality. Focus on operationalisation of harms measurement, especially in UK context. Key metrics are mapped against domains of gambling-related harms. Ten 'foundational' metrics identified (with Gambling Commission, RGSB and GambleAware) as most	Pragmatic rather than robust approach to framework. Reliant on self-report or incomplete societal information. No involvement of lived experience in development. Often difficult to operationalise; each metric will require significant scoping, stakeholder engagement, testing, etc. Some attempts at operationalisation have been

First Author and Framework	Country	Year	Long Title / Publication	Overview	Development Process	Strengths	Limitations
				be experienced: individual, families and social networks, community and societal.		promising for starting to attribute social costs to GRH (e.g., benefit claims; bankruptcy; debt services, etc.)	critiqued as having various biases and errors. Doesn't consider severity of GRH.
Blake / CYP Framework	UK	2019	Measuring gambling-related harms among children and young people: A framework for action (Blake et al. 2019)	An adjunct to the above Wardle framework, aimed at Children & Young People (CYP). Aims to capture GRH both for own gambling and also effects of adults' gambling on CYPs. Potential harms divided into four main domains with sub-themes: financial, educational/social, relationships, health.	Expert workshop with professionals; focus groups in schools with young people aged 13-18. Again, pragmatic approach with limited number of participants.	Considers both own gambling as well as the gambling of others e.g., parents, family, friends. Acknowledges the positive impacts of gambling and allows for better identification of whole scope of harms. Engagement with both professional and young people as part of the development phase, albeit limited. Developed into set of items for integration into existing survey (GC CYP survey).	Sole focus on harms experienced during adolescence. Limited range of subjects - harms only considered at individual level. Doesn't consider temporality of harm. Doesn't consider severity of harm.
Latvala / PHIGam	Finland	2019	Public Health Impacts of Gambling (PHIGam) mode (Latvala et al. 2019)	Public health approach aimed to fill a gap in literature and provide a theoretical model conceptualising the effects of gambling. The model divides effects into both negative and positive. Benefits and costs are categorised into three classes: financial, labour, and health and wellbeing.	Theory driven approach from small group of experts; combining costing methods with pre-existing frameworks (i.e., Abbott and Langham).	Impacts are examined on separate levels (personal, interpersonal, community/societal). Longer-term impacts are acknowledged. Model explicitly acknowledges that some harms can also stem from so-called general impacts in addition to the impacts	Community/society level impacts mostly based on North American (largely the impacts of casinos). Doesn't consider severity of harm. No engagement with people with lived experience in development.

First Author and Framework	Country	Year	Long Title / Publication	Overview	Development Process	Strengths	Limitations
				These classes manifest on personal, interpersonal (effects on others) and societal levels which are split up in the model. The model also contains a temporal dimension and refers to the development, severity, and scope of the gambling impact.		of individual gambling. Model considers both negative and positive effects of gambling.	
Non-Gambling Frameworks							
MacCoun / US Drugs Taxonomy	USA	2001	Taxonomy of drug related harms (MacCoun & Reuter, 2001)	Chapter 6 of the book 'Drug War Heresies: Learning from Other Vices, Times, & Places ' presents a "taxonomy of drug-related harms". This is a list of nearly 50 harms categorised into health, social and economic functioning, safety and public order, and criminal justice.	No explicit methodology. Expert knowledge and narrative literature review.	Considers causes of harm from different perspectives including use, illegal status, and enforcement. In contrast to work on GRH, specifically evaluates relationship between policies (e.g., illegal actions; black markets etc.) and harm. Impacts of a variety of subjects considered - drug users, drug dealers, family, friends, employers, neighbourhoods, and society.	Harms highly specific to the time period/context discussed in the book - changes in social conditions and attitudes since 1960s. Severity of harm not considered. Temporality of harm not considered.

First Author and Framework	Country	Year	Long Title / Publication	Overview	Development Process	Strengths	Limitations
Nutt's Drug Matrix	UK	2007	Matrix of Drug Harm (Nutt et al. 2007, Nutt et al. 2010)	A 9-category matrix of harm, comparing a range of illicit drugs in an evidence-based fashion. Systematic framework and process that could be used by regulatory bodies to assess the harm of current and future drugs.	Expert input using a systematic, Delphic procedure: multiple-criteria decision analysis (MCDA) workshop attended by experts and specialists who scored each drug on each harm criteria in an open discussion and then assessed the relative importance of each criteria within each cluster and across clusters. Nutt et al. 2010 updated the framework with improved scoring and weighting of harm. Calculation of weighted scores provided a composite score on two dimensions (harm to individual and harm to others), and an overall weighted harm score. Harm to users/others divided into physical, psychological and social domains.	Involvement of a range of experts. Involves a formal, quantitative assessment of several aspects of harm which allows comparison between different drugs. The methods can easily be re-applied as knowledge advances. Considers both harm to users as well as harm to others.	Only considered harms and not benefits (e.g., commercial benefits of alcohol). Approach not applicable to countries with different legal and cultural attitudes to drugs (model needs to distinguish between harms directly resulting from drugs and harms resulting from control system). Temporality of harm not fully explored.
Room / Alcohol and Others	UK	2010	The drinker's effect on the social environment. (Room et al. 2010)	Conceptualises harms from alcohol to others, both from individual and collective alcohol use. Four domains of social costs: health, crime/public disorder, workplace, family/social networks.	No explicit methodology. Narrative literature review.	Considers variety of data sources to identify harm - literature reviews as well court records, coroner's studies, and casefiles.	Only considers harm to others (not harm to those drinking alcohol) - friends, family, colleagues, and the public. Doesn't consider severity of harm. Doesn't consider temporality of harm.

First Author and Framework	Country	Year	Long Title / Publication	Overview	Development Process	Strengths	Limitations
				The framework examines people affected by alcohol user in roles: friends, family and household, work and public.			

4.1.1 The Abbott / GREO Framework (2013-present)

The first framework to undergo development was the 'Conceptual Framework of Harmful Gambling' (CFHG). Although developed by an international group of experts, and having an international scope, the work was funded and led by the Canadian organisation, Gambling Research Exchange Ontario (GREO). Whilst the first edition of this framework was published in 2013[30], one of the strengths of this work is its ongoing nature, with updates published in 2015 (second edition[31]) and 2018 (third edition[32,33]); an explicit acknowledgment to the evolving nature of both society and scientific evidence.

Designed to be consistent with a public health and social model of gambling, this framework is primarily a model of factors *driving* GRH (i.e., rather than the actual outcomes of harm), aiming to be a comprehensive view that spans countries, cultures, and scientific disciple. These are synthesised into four 'gambling domains' (gambling types; environment; resources; exposure) and four 'general domains' (cultural; psychological; social; biological), with each domain assessed at the individual, family, and community level. See Figure 2 below for an overview of the framework and Table 1 for full details of the framework.

Figure 2. The Abbott 'Conceptual Framework of Harmful Gambling'[32,33].

The Canadian framework has numerous strengths, where the evidence for each domain (assembled by an international group of experts) is presented in an easy-to-navigate, web-based frontend, aimed to have utility for a variety of stakeholders.

However, shortcomings of this framework include the lack of explicit methodological approach in its development (i.e., such as a systematic review; lived experience input, etc.). The authors also acknowledge the evidence being weaker for non-individual factors, e.g., harms at the family, community, and population level. Finally, as a model primarily investigating the causes/drivers of harms, it rarely discusses the outcomes of harm. In this regard, however, the

authors of the Abbott/GREO framework specifically cite the Langham framework, below, as complementary.

4.1.2 The Langham / CQUniversity Framework (2016)

The 'Conceptual Framework of Gambling Related Harms' (CFGRH) was developed during a well-resourced, multi-year study conducted at Central Queensland University (CQUniversity). This project investigated gambling harms at a population level in Victoria, Australia[27] (sometimes known as the '*Australian burden of harms study*').

This research not only produced a robust, detailed framework of GRH[14] but also produced a series of related outputs, representing a rich vein of research around the conceptualisation and measurement of GRH. These outputs from the Experimental Gambling Research Laboratory, CQUniversity, are the most heavily discussed within this document. As our findings move through the frameworks and measurements, and then onto the conclusions and recommendations, this work often provides a robust foundation upon which future work can be constructed.

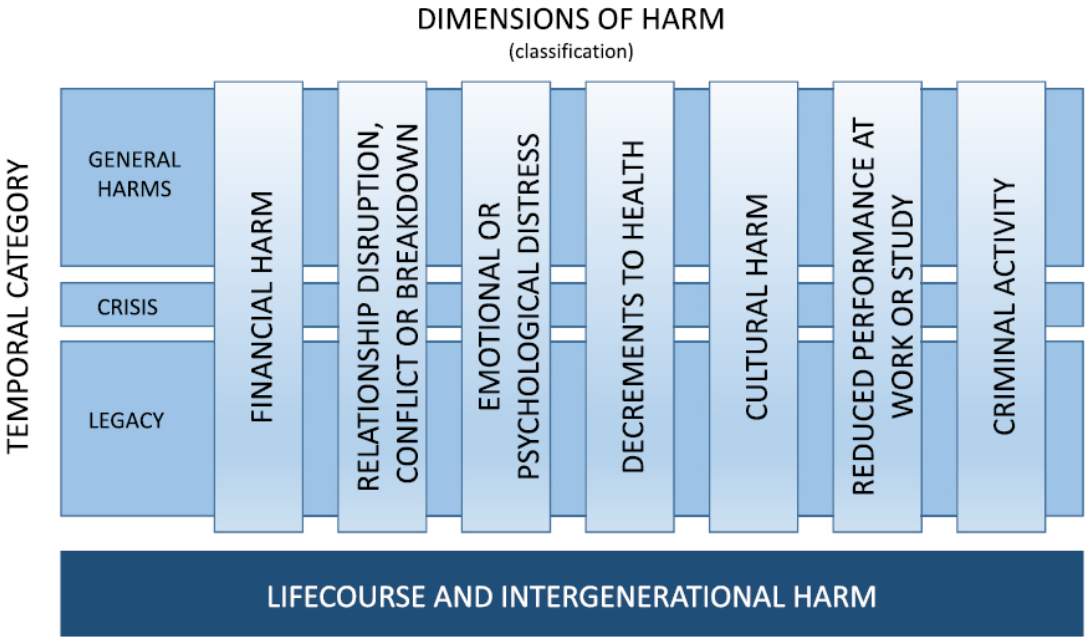

Figure 3. The Langham 'Conceptual Framework of Gambling Related Harms'[14,27].

The Langham framework aimed to address the experiences and consequences of GRH. Of the GRH frameworks identified, this framework is the most cited within the academic literature, in addition to representing the most robustly developed. Development involved structured literature reviews, qualitative interviews with people who gamble, affected others, focus groups and interviews with professionals, alongside analysis of public forum posts for people experiencing gambling harms. The results from these methodologies were synthesised into a scientific taxonomy, which recognises both dimensions of harm and temporal categories, including crises points, harms beyond gambling engagement, and legacy harms (see Figure 3). The seven

dimensions of harm (financial, relationships, emotional or psychological, health, work, cultural, study or economic activity, criminal acts) can spread across temporal categories.

The taxonomy for each of these dimensions/categories is supplied with a comprehensive list of real-world examples, derived from the underlying research, where (for example) the relationship domain is reflected in harms that range from the disruption of healthy functioning relationships, through conflict, breakdown and onto estrangement, isolation, and intergenerational impacts with children. Each domain of the taxonomy is reflected across people who gamble, affected others, and broader community.

The primary aim of the taxonomy was to facilitate the subsequent development of robust harms measurement, which will be discussed in the 'measurement' section of our results. Here, the Langham framework has been used to develop standardised survey/questionnaire tools (developed as the Short Gambling Harms Screen (SGHS) discussed in section 4.3.2) or alternatively health economic approaches (discussed in section 4.3.4).

4.1.3 The Wardle / Framework for Action (2018)

The 'Framework for Action' involved an academic-led collaboration with the Gambling Commission and GambleAware. Again, similar to the other frameworks, it was contextualised within a public health model of gambling, but additionally also viewed GRH through the lens of a socio-ecological model.

In comparison to the more extensively developed and comprehensive Abbott and Langham frameworks, this model was aimed as a pragmatic operationalisation of harms measurement, to explore the possibility of attaching cost estimates to various harms. This was tailored to a UK context, and was mindful of potential measures and metrics (including both self-report measurement and objective/observational data, such as court records) for policy and regulatory action. With a more targeted and pragmatic scope, the underlying framework had little explicit methodology, beyond expert input focus groups.

The framework itself reiterates the constituent components of the earlier Australian framework, albeit repackaged into different ordering of domains and sub-domains (see Figure 4). For example, the separate physical and psychological harms in the Australian model are encapsulated into a single 'Health' domain within the UK framework.

The Framework for Action also contextualises harms within a socio-ecological model, widely used in public health[34]. Here, it is recognised that choices of individuals, while important, are deeply influenced by social contexts and processes, and that the 'individual' is embedded within the 'social'.

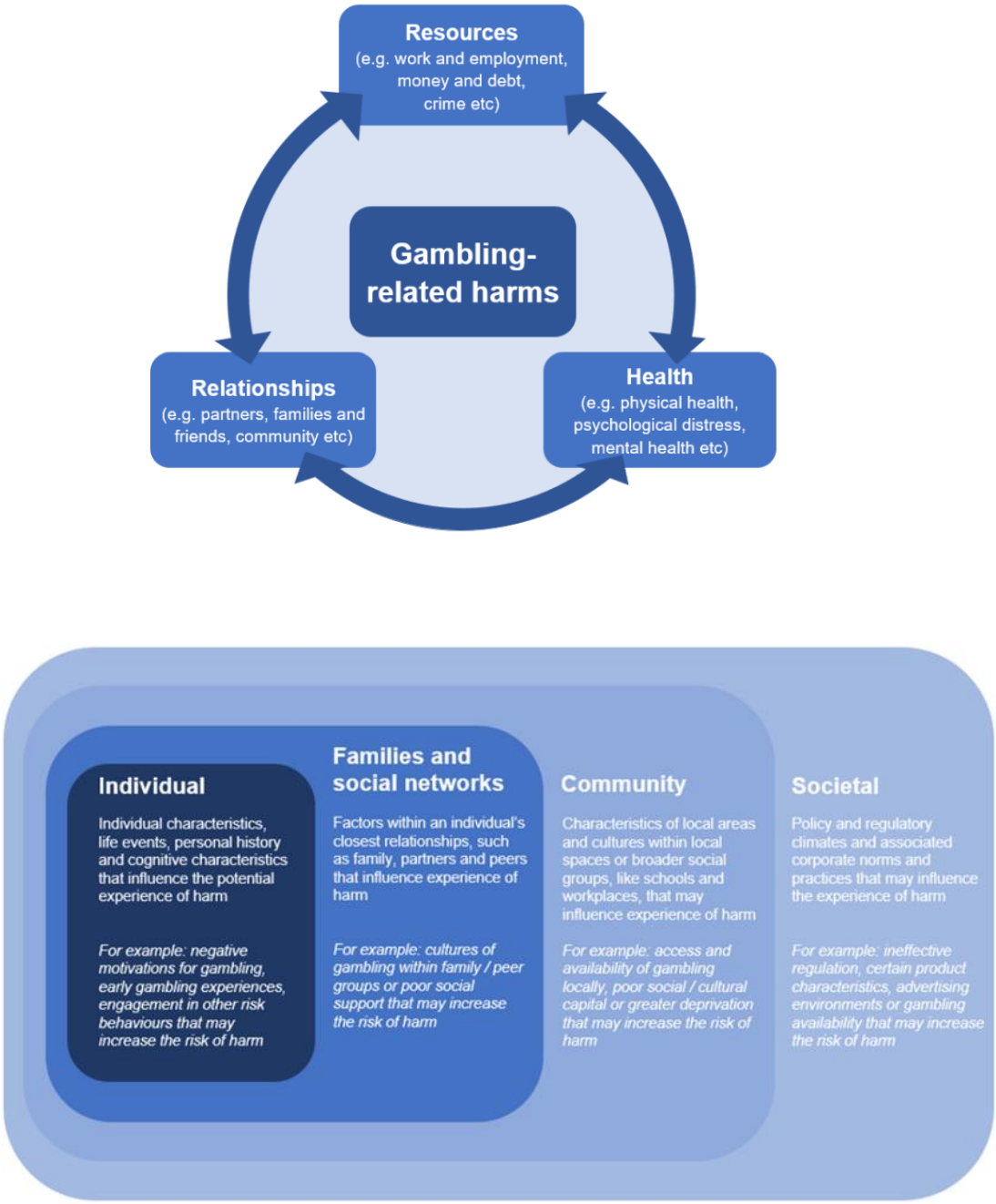

Figure 4. The Wardle 'Framework for Action'[35]. The over-arching framework is provided in the top panel; the socio-ecological model for GRH within the bottom panel.

One of the core aims of the Framework for Action was the operationalisation of harm measurement, and therefore, over 50 possible metrics for GRH were mapped onto and overlayed across the full framework (not shown here; see original publication). A number of these were identified as potentially contributing to quantifiable social costs: loss of employment; experience of bankruptcy and/or debt; loss of housing/homelessness; crime associated with gambling; relationship breakdown/problems; health-related problems; suicide and suicidality.

Furthermore, beyond self-report measures of these harms, the work provided a limited number of examples of actionable measurement approaches. Here, a number of 'foundational' models were identified (with the Gambling Commission and GambleAware) as the most promising metrics for starting to attribute social costs to GRH. We will return to such measurement approaches in section 4.3.3.

4.1.4 The Blake / Children and Young Person (CYP) Framework (2019)

The 'Children and Young People Framework for Action' was developed as a follow-up to the UK Framework for Action[36]. Here, it was recognised that children and young people experience both direct harms and indirect harms (i.e., as an Affected Other) in idiosyncratic ways. The work was again somewhat pragmatic and limited in scope, essentially comprising expert workshop of professionals and a focus group with a small number of school children aged 13-18. The authors noted the limited numbers and demographics of the participants.

The framework builds upon the adult Framework for Action, noting its definition that 'gambling-related harms affect young people in the present and may also affect their future potential. The harms may be a result of their gambling or the gambling of others around them e.g., parents, family, friends or other people in their networks.' The main adjunct to the adult framework is an added 'development domain', comprising educational and social/emotional functioning, alongside other adjustments of the adult framework (see Figure 5).

The Children and Young Person framework has been subsequently developed into a set of items using cognitive interviewing (albeit with teenagers, not children); and has been integrated (from 2022) into the ongoing 'Young People and Gambling' annual survey conducted by Ipsos for the Gambling Commission[37]. Alongside data on participation and problem gambling rates amongst young people, this survey now includes additional questions[3], providing headline statistics on aspects such as the impact of gambling on sleep and schoolwork, and the self-perceived impacts of other family member's gambling. These statistics, however, have only (so far) been reported for a single year (2022), with only cursory and headline data reported. As a result, the survey does not yet provide much in the way of detailed or nuanced analysis about how harms are experienced by various demographics and age ranges of children and young people in the UK.

[3]The new questions are referenced here: https://www.gamblingcommission.gov.uk/report/young-people-and-gambling-2022/ypg-2022-the-impact-of-gambling-on-young-people-summary

Figure 5. The Blake 'Children and Young People (CYP) Framework for Action'[36]

4.1.5 The Latvala / PHIGAM Framework (2019)

The 'Public Health Impacts of Gambling (PHIGam)' model again emphasises a public health perspective[26]. Whilst developed by a Finnish academic research group, the work draws from a broad international evidence base, utilising a theory-driven approach from a small group of experts. The model explicitly combines many aspects from the previous frameworks (especially the Abbott and Langham models), again having similar individual, interpersonal and community/society level harms, alongside a temporal dimension.

One novel aspect of this framework is the inclusion of positive impacts, which directly oppose the negative/harms aspects of gambling. This includes community/society level positive impacts such as economic growth and jobs, interpersonal benefits of increased social activity, and person benefits such as income and leisure activities (see Figure 6).

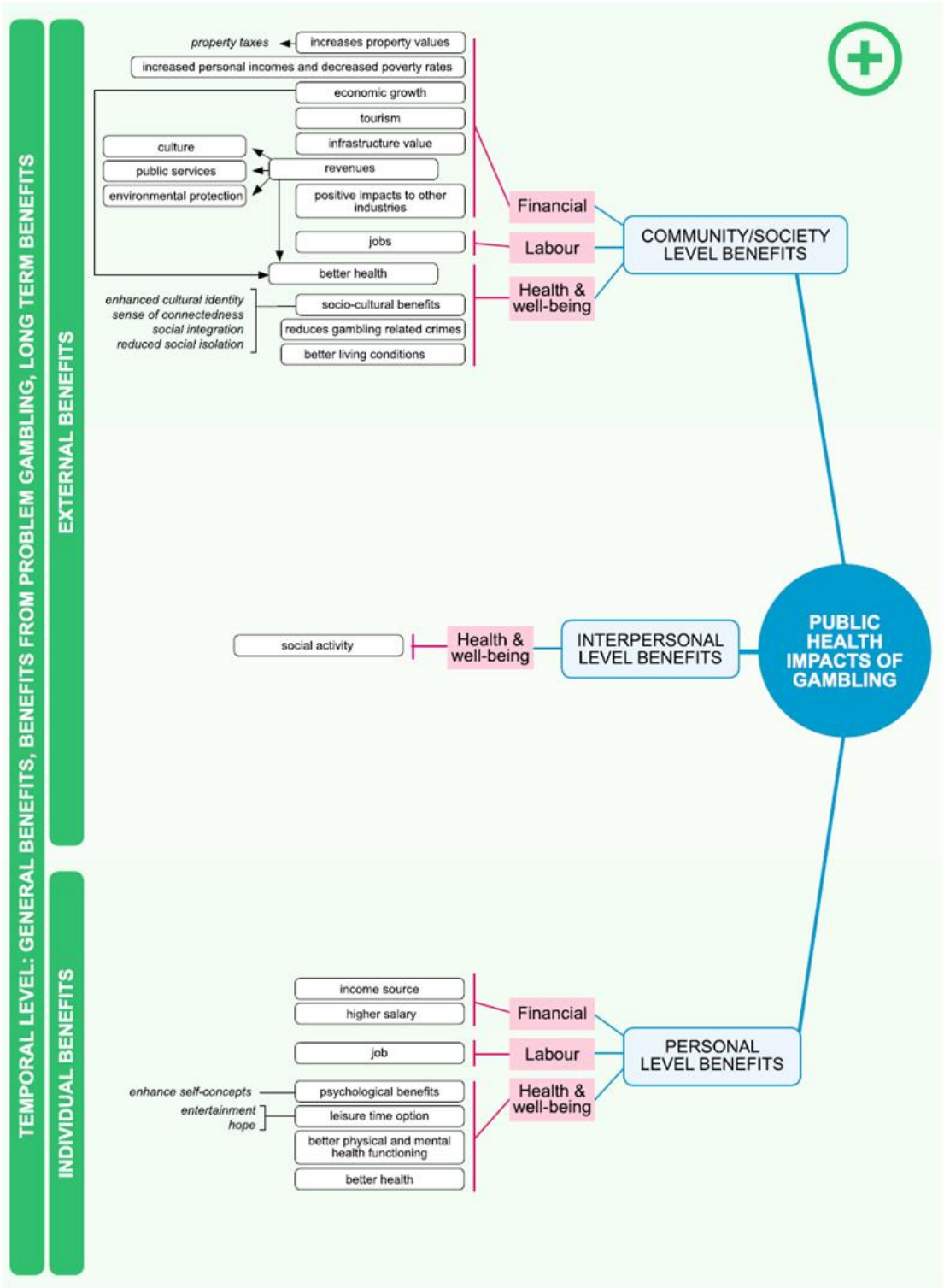

Figure 6. The Latvala 'Public Health Impacts of Gambling (PHIGam)' model[20]. Only the 'positive impacts' side of the framework is shown; the 'negative impacts' largely reiterates the earlier discussed frameworks.

Through the integration of previous frameworks and evidence, the Latvala PHIGam model identifies a number of gaps and limitations with existing work, including: a paucity of research on potential positives; problems with measuring social and interpersonal impacts, (often non-monetary in nature and ignored); a lack of data about the financial, labour, health and wellbeing impacts beyond the individual level; and the lack of knowledge about interpersonal and community/social level impacts (social cohesion etc.). Furthermore, using a theory-driven approach based on literature, the methods did not involve any qualitative work or lived experience input, and with the underlying evidence drawing heavily from North American research, the impacts of land-based casinos (both positive and negative) may not have cross-cultural relevance for contexts such as the UK.

4.2 Frameworks and Lessons from Adjacent Sectors

Public health approaches for harm reduction were applied to areas such as drugs and alcohol some years prior to gambling[6–8]. We were therefore surprised that the literature searches only identified three explicit harms frameworks for alcohol or drugs[38–41]. These are summarised below (also see Table 1).

The first of these, published in 2001, is contained within a dedicated chapter in the book *'Drug War Heresies: Learning from Other Vices, Times, & Places*' by MacCoun & Reuter[38]. As part of a multidisciplinary work that examines the history and possible futures for drug policy in the USA, it contrasts drug prohibition against controls for alcohol, nicotine, gambling and sex work.

Within the book, the 'taxonomy of drug-related harms' lists nearly 50 harms, which are categorised into health, social and economic functioning, safety and public order, and criminal justice. The framework considered a broad range of causes of harm, including harm from the use of drugs, the illegal status of drugs, as well as enforcement. As a book chapter, the framework represents an expert summary of harms, without any explicit underlying methodological approach.

The second framework, published in 2010, is the 'Conceptual Framework for Studying Alcohol's Harm to Others'[39]. This framework aims to conceptualise harms from alcohol to others, both from individual and collective alcohol use. The framework details four domains of social costs related to alcohol: health, crime/public disorder, workplace, and family/social networks. The framework examines people affected by the alcohol user in four sets of roles: friends, family, and household, work, and strangers. There is no explicit methodological approach underlying the framework. In the conclusion, the framework notes that from the main types of data used to measure harm, survey data is dominated by less severe problems, whereas data from social institutions (for example the police or accident and emergency services) targets more severe problems. Both are needed for a three-dimensional view of alcohol-related harms.

The final framework, first published in 2007 but with an update in 2010, is the Nutt *et al*., 'Matrix of Drug Harm'[40,41]. These publications represent the two most heavily cited papers within our

core set of publications[4]. This research was designed to specifically address questions about UK drug policy, seeking to investigate how closely the UK drug classification system relates to harms.

Within this work, the harm framework was developed using an expert panel, identifying 16 harm criteria, divided into both harms to self and others, comprising: physical, psychological, and social harms. Whilst the framework itself is somewhat limited in scope, the unique aspect of this work was the deployment of the framework within a formalised 'multicriteria decision analysis' (MCDA) approach, where each drug was rated and weighted according to each specific harm in expert workshops. This approach enabled the authors to conclude that UK drug classification correlates poorly with actual harms.

Overall, these various alcohol/drugs frameworks are somewhat limited when compared to the gambling harms frameworks; both in terms of the underlying methodological rigour and the scope and extent of mapped harms. Within the frameworks, some of the harms listed – such as physical dependence or drug-related mortality – are unique to the substance-based nature of drug and alcohol use, and do not overlap with gambling-related harms. Conversely, other domains – such as loss of tangibles, relationship impact, and crime – have substantial similarities with GRH.

Due to the limitations of these drugs/alcohol frameworks, there is little to learn from the nuances of the frameworks themselves. More broadly, however, some notable lessons might be gleaned from this adjacent literature. As controlled and often illegal substances, the drugs literature pays close attention to the socio-political landscape and the consequences of legislation and prohibition (both intended and unintended). Here, it is observed that a greater proportion of harms can arise from the illegal status of drugs (and subsequent law enforcement) and political, ideological opposition to harm reduction interventions, rather than from the actual drug use itself[38].

Whilst not an explicit 'framework', an additional commentary paper within our 'core texts' made related points, arguing that although harm reduction has developed in parallel with the public health movement, there remains an over-reliance on individualistic modes of behaviour change[42]. The paper offers instead the concept of the 'risk environment' for understanding the role of environments (e.g., social, or political structures), arguing that if the primary determinants of harm are economic and social, then the remedies must also be economic and social.

Despite the academic and citation impact of the Nutt *et al.* framework, it is interesting to note that this type of MCDA 'rating and comparison' approach has not been widely deployed in other contexts. Whilst the approach requires specialist methodological expertise, it could nonetheless be readily deployed in spheres such as gambling. Here, the existence of robust harms frameworks (e.g., the Langham framework, above) could be used as a readymade framework for the MCDA approach, allowing MCDA to compare and contrast GRHs.

[4]Data from Google Scholar's 'cited by' feature.

Obvious applications would be a comparison of harms derived from different gambling products (e.g., lotteries, versus horse racing, versus online slots, etc.), with potential implications for policies such as stake limitations where more harmful products might merit greater restrictions. A second suggestion would be to compare aggregate harms from gambling to other potentially harmful behaviours, such as alcohol, illegal drugs, and problem videogaming disorder or social media use.

4.3 Subject Matter Expert workshops: Implications for frameworks of harm

The Subject Matter Expert workshops were structured similar to this document, where the first half of each workshop dealt with frameworks of harm (presented below); the second half dealt with measurement of harm (with results presented later, at the end of section 4.3 on harm measurement). In the workshops, we presented a lay-friendly version of results around frameworks of harm, followed by a structured discussion about the frameworks (both for gambling and from adjacent sectors), which aimed to critique any gaps and limitations in the harms frameworks, and explore the utility of other approaches from adjacent sectors. This was followed by a discussion of the best next steps for research and harm minimisation. Several key themes were elicited, which are summarised below. The SME workshops comprised a mixture of academics (from both a gambling and drugs research background), gambling lived experience participants, and gambling experts from the voluntary and treatment sector. The main points identified in relation to frameworks were:

For gambling harms frameworks

The coverage of frameworks (especially the Langham framework) was deemed comprehensive and representative of lived experiences. Nonetheless, participants highlighted several areas which were less well covered, which included: the gendered impacts of GRH; stigmatisation, discrimination and ostracisation (e.g., by friends/family) as a form of gambling harm; the range (and differences) in experience between children and young people of different ages, where the Children and Young Person framework looks at 13-18 year olds collectively; the interrelationship between harms relating to gambling, alcohol and drug use; protective factors for GRH.

Furthermore, it was also felt that the broader regulatory environment which impacts GRH was often overlooked, and this was highlighted as a gap in comparison to drug harms frameworks, which consider that harms vary depending on the regulatory/legal environment.

Subject Matter Experts also highlighted that lived experience input into frameworks could be more diverse and that they could be better adapted to the UK cultural context (e.g., considering different ethnic minorities). Participants emphasised that frameworks need to be flexible and adaptable (e.g., to different types of gambling) to be practically useful and they need to recognise that harms change over time.

Participants with knowledge and experience of treatment services also highlighted that the frameworks do not include recovery. Within existing gambling treatment services, recovery frameworks have been adapted from the mental health and alcohol sector. Whilst ad-hoc, “in

house" tools may exist, t was felt that a specialised and validated gambling framework for recovery, service delivery, evaluation, and outcome measurement was warranted.

Generally, given the existence of largely comprehensive frameworks, workshop participants questioned whether there was a need for a new framework or combined framework. Instead, they felt that the focus going forward should be around the operationalisation of existing frameworks for measurement. Any further framework development should focus on the most notable oversights, such as stigma and frameworks for recovery.

The MCDA approach for gambling:

Participants in the workshops were presented with information about the MCDA approach and how this has been used for examining drugs harms. The utility of this method for gambling was discussed, in particular the notion of ranking the harms of different gambling products. There were mixed views on the utility of this approach, but the benefits of such an approach for gambling were largely questioned by participants.

Participants felt that the results might have unintended consequences, including harm-reduction approaches being misdirected towards specific products rather than more important factors, such as loss chasing and the 'harm journey' life course[43]. Overall, it was felt that a harm ranking 'number' derived from an MCDA approach and applied to different products might not be very useful, informative, or actionable.

Despite these challenges, others pointed to potential utility for licencing and policy. The lack of policy representation in our SME workshops – where such an approach might have the most impact – is important to recognise and further investigation might be required.

4.3 Measurement approaches for Gambling Related Harm

Our literature searches identified a variety of approaches for measuring GRHs. Broadly, we categorised these into:

- Traditional questionnaire/survey tools, such as the PGSI, which have been used as a proxy for harm;
- A range of newer questionnaire tools, specifically designed to capture GRH;
- The use of objective and observational approaches to catalogue harms, such as investigating criminal convictions or analysing bank account data;
- Health economic approaches to quantify harms as decrements to quality of life, as a direct analogue to global 'burdens of disease' studies.

Whilst not an exhaustive list, Table 2 summarises some of the key questionnaire tools (for reference, some of key tools, such as the PGSI and the SGHS, are included in Appendix 2). Table 2 provides details such as academic references, recall periods, the harms frameworks underpinning the measurement (if there is one), and various strengths and limitations. Below, we briefly summarise the literature for each of the four approaches.

4.3.1 Classic approaches: measurement of problematic or pathological gambling.

Within recent academic discourse, there has been some criticism around historic approaches for measuring GRH[5,11,14–16]. Until recent years, much work utilised 'classical' measurement approaches for gambling, such as the PGSI[44] or South Oaks Gambling Screen[45,46]. These tools are largely predicated on historic, clinically-derived notions of 'pathological' versus 'non-pathological' gambling[5]. In contrast , recent research has provided a more nuanced perspective, recognising that harms and benefits of gambling are not a binary outcome; but instead, are a matter of degree[11,27,47].

There are other issues with these historic tools[16]. Developed several decades ago, they lack robust underlying theoretical frameworks (beyond historic psychiatric/clinical guidelines[48]) with a limited development cycle that had little or no input from people with lived experience. Such processes are now considered essential elements for the development of effective self-report measurement tools within medical science; reflected in up-to-date scientific and regulatory guidelines[23,24].

Ultimately, the lack of underlying harms framework for these historic "instruments" (questionnaire tools) can be observed in the "items" (the questions) of the instrument. Here, there are criticisms that these instruments conflate consequences of compulsive gambling (i.e. the actual harms) with behavioural risk factors (pre-occupation, lack of control, etc.)[11]. As a result, entrenched definitions of 'problem gambler' are derived from an ambiguous, ill-defined mix of risk factors and outcomes, and tools such as the PGSI or South Oaks Gambling Screen represent inappropriate proxies of harm. Moreover, it is now recognised that the entrenched use of such terminology within research, public health and non-governmental organisations unwittingly places blame directly on individuals, and as such contributes to the stigmatisation and exacerbation of gambling harms[49].

[5]It is worth noting that the definition of 'Problem Gambler' as PGSI = 8+ has remained unchanged and rarely challenged since the original publication of Ferris and Wynn, over two decades ago.

Table 2. Measurement Instruments. Pink (top panel) = "classic" instruments based on clinical notions of problem gambling; Turquoise panel = instruments designed specifically to measure harms. The items for some key instruments are included in Appendix 2; all of the items for the HC-72 (along with Item Response Theory data) are included in appendix 3.

Measurement Tools	Measurement Approach	Summary	Publication	Items	Response categories; Timescale	Underlying Harms Framework	Item Development	Strengths	Limitations	Domain Coverage Vs Langham Framework
Clinical/Problem Gambling Instruments										
PGSI Problem Gambling Severity Index	Self-report	Index of problem gambling; with discrete cut-offs.	Ferris and Wynne, 2001	9	Five-point Likert (never to always); last 12 months.	None. Based on classical clinical/ addiction models.	Literature review; expert input.	Psychometrically well validated. Well used as population screen.	Conflates behaviours and harms. No lived experience input.	Poor/non-specific
SOGS South Oaks Gambling Screen	Self-report	Tool for gambling pathology based on DSM criteria.	Lesieur and Blume, 1987	12 scored items	Variable; lifetime.	None. Based on classic clinical/ addiction models.	Interviews with people who gamble, albeit framed by DSM.	Well used as a clinical tool.	Conflates behaviours and harms.	Poor/non-specific
VGS Victoria Gambling Screen	Self-report	Early attempt at harms measure-ment.	Ben-Tovim et al., 2001	21; 3 scales including harms to self (16 items) and others.	Binary and five-point Likert (never to always); last 12 months.	DIPG Report, 1997; an early public health approach to gambling harms.	Qualitative focus groups; Literature; Experts.	Early attempt at harms measurement.	Some "harms" are behaviours; vague item content; not well used.	Poor/non-specific

Measurement Tools	Measurement Approach	Summary	Publication	Items	Response categories; Timescale	Underlying Harms Framework	Item Development	Strengths	Limitations	Domain Coverage Vs Langham Framework
Harms Instruments										
HC-72 (our abbreviation) 72-item checklist	Self-report	Checklist of harms deployed in Australian "burden of harm" study.	Browne et al., 2016	72 Also used for affected others	Binary Yes/No, or four-point Likert.	Based on Langham/ Australian model.	From Langham et al., involving lit reviews, focus groups, interviews, and online forum posts.	Strong underlying conceptualisation and development. Underpins other modern measures. Has been adapted for affected others and retrospective/ legacy usage.	Too long for most uses. Not validated beyond original Australian context.	Good coverage (to be expected, as items derived from Langham framework).
SGHS Short Gambling Harms Screen Various versions: 10,18,20 items	Self-report	Developed as a short screen from the 72-item checklist and Langham framework.	Browne et al., 2018	Various versions 10-20 items	Binary Yes/No, or four-point Likert version also developed; Last 12 months	Based on Langham/ Australian model.	Items selected based on frequency of endorsement along with and broad coverage from full 72 items.	Most widely accepted harms screen, based on robust development cycle. Several length versions available, including for affected others.	Criticised as "harms" representing opportunity costs; may thereby overestimate burdens of harm for low-level harms.	10 item version is limited mostly to financial and psychological harms, which are mostly low severity items; the 20-item extends into relationships and work/study, covering a broader range of severity.

Measurement Tools	Measurement Approach	Summary	Publication	Items	Response categories; Timescale	Underlying Harms Framework	Item Development	Strengths	Limitations	Domain Coverage Vs Langham Framework
UGHS "Unimpeachable" Gambling Harms Scale	Self-report	Developed to test whether SGHS less severe probes represent opportunity costs rather than genuine harms.	Murray Boyle et al., 2021[50]	10	Binary Yes/No; Last 12 months	Based on Langham/ Australian model.	Specially constructed scale of relatively severe harms; 10 items drawn from Browne et al.'s 72-item pool of harms.	Probes more severe harms.	Specifically designed instrument, so coverage deliberately ignores lower ranking harms.	At least one item in all domains, at medium+ severity.
HQ (or GES) Harms Questionnaire (or Gambling Effects Scale)	Self-report; in 2 dimensions of degree and relationship to gambling	Tool for measuring both presence of harm and relationship to gambling.	Shannon et al., 2017[51]	104 items / 48 indicators of harm	Two-part items: severity of the harm; and relationship to gambling.	Cites Abbott and Langham frameworks.	48 indicators of harm based on a literature review and clinical notes from seven specialist gambling treatment centres.	Novel approach with 2-part items: harm level / due to gambling Seven domains of GRH: financial, health, disengagement from leisure pursuits, critical events, social and relationships, employment and education, psychological harm.	Requires insight from participants. Unvalidated and unusual approach for GRH, albeit previously used for alcohol.	SCALE NOT PUBLICLY AVAILABLE

Measurement Tools	Measurement Approach	Summary	Publication	Items	Response categories; Timescale	Underlying Harms Framework	Item Development	Strengths	Limitations	Domain Coverage Vs Langham Framework
CPGI-PH CPGI-Population Harm	Self-report	CPGI Supplement to assess GRH at population level.	Quilty et al., 2015	10	Four-point Likert scale (Disagree to Strongly Agree); past 12 months.	No explicit underlying framework, simply "public health model".	Systematic review of the literature and clinical instrumentation.	GRH at population level: to family members, romantic partners, friends, workplace, and community.	Not well used/cited. Some items not directly related to GRH. Items very non-specific.	Items very non-specific e.g., "has gambling caused problems for…", albeit does span relationship/ work / other domains.
NatCenGH-13 (Our abbreviation) Wardle/NatCen Harms Survey Questions	Self-report	Developed for the upcoming UK Gambling Commission annual survey.	Wardle et al., 2022	13	Variable (binary or Likert); past 12 months.	Based on Langham/ Australian model.	Derived from Browne's 72 harms checklist; questions repeated across three surveys to look at stability of responses and reviewed by two external experts.	Mirrored harms from gambler and affected others. Reasonable development process.	Weighted towards financial and relationship harms.	Financial, Relationship, Health and Crime; some crises harms.

Despite such shortcomings, given their popularity, these tools have been repurposed within a substantial portion of GRH literature; particularly earlier work[11]. Here, the PGSI has sometimes been utilised "as is" as a proxy for harm[52]. Alternatively, other research has targeted specific "harms" items of the PGSI (e.g. Item 6, concerning "*health problems including stress or anxiety"* or Item 8, concerning *"financial problems"*)[53].

Concerning such research, a recent review from Browne *et al*., '*The Evolution of Gambling-Related Harm Measurement: Lessons from the Last Decade*' helpfully documents the full details behind these various approaches[11]. It concludes that such historic approaches are inadequate, and that when applying public health approaches to gambling, we need to avoid the inadequate (and potentially stigmatising) pseudo-clinical categorisations of historic measurement approaches, and instead capture the full breadth of harms to appropriately develop and target harm minimisation strategies[14].

Anachronistic instruments such as the PGSI and South Oaks Gambling Screen do not achieve these goals. This can be illustrated by mapping these tools against the robust frameworks of harm that have been developed over recent years (identified in section 4.1). In Figure 7 below, the PGSI is mapped against a revised version of the Langham GRH framework.

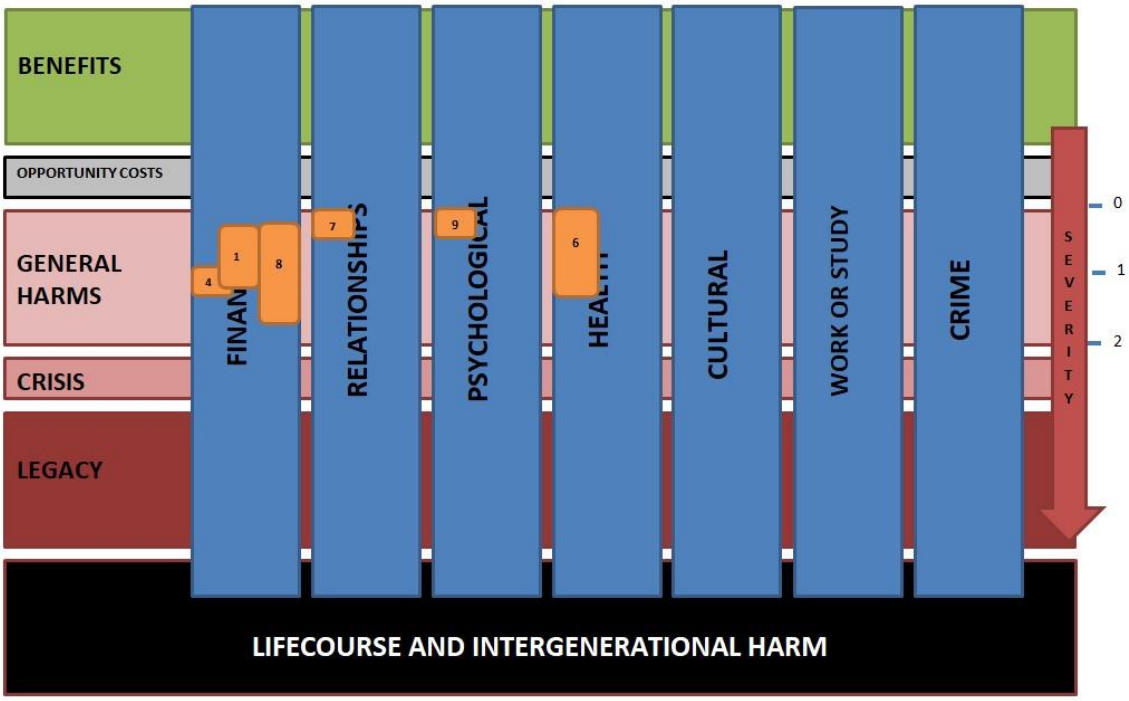

Figure 7. Mapping the PGSI against the Langham GRH framework. Item locations are indicative only. Nonetheless, the 'severity scale' on the right-hand side is derived from previous Item Response Theory results; see methodology and Appendix C for the underlying data. It is worth noting that the severity scale is logarithmic in nature, where a severity of 2 is an order of magnitude higher than a severity of 1; a severity of 3 is two orders of magnitude higher than 1, etc. This makes intuitive sense, where harms such as 'bankruptcy' are several orders of magnitude more severe than low-level financial harms, such as reduced expenditure.

Figure 7 reveals that a number of items cannot be mapped as harms (2, 3 and 5), but are instead behaviours or markers of tolerance (e.g., Item 2: "*Have you needed to gamble with larger amounts of money to get the same feeling of excitement*?"). It also reveals that there is a predominance of financial harms over other types of harm. However, some of these only imply harm (e.g., Item 1, "*bet more than could really afford to lose"*). Other items (i.e., 1, 6 and 8) cover a broad, ambiguous, and subjective degree of severity (e.g., the ambiguous "*financial problems*" of Item 8 or "*health problems*" of Item 6). These are therefore elongated along the severity scale. Overall, these observations highlight that tools such as the PGSI are conceptually weak representations of gambling harms. A new generation of tools is required.

4.3.2 New approaches: measurement of harms

Over the last decade, a range of instruments have been developed with the specific objective of measuring GRHs. This movement has been directly aligned with broader trends within gambling research and prevention, which have moved increasingly towards public health and harm reduction models. The second section of Table 2 details a selection of key instruments.

Early tools for GRH measurement (such as the 'CPGI Population harm'; a supplement to the CPGI to assess GRH at a population level[54]) tended to be one-off instruments, suffering from weak underlying conceptualisation and development. They have not been well used since initial development[54]. The recent review on the '*Evolution of Gambling-Related Harm Measurement'* documents a number of other, similar, one-off tools[11].

Subsequent developments, however, have rendered these early attempts somewhat obsolete. The robust Langham framework for GRH (discussed in section 4.1.2) has provided a strong conceptual foundation for measurement. Following development of this framework, it was utilised to develop a binary checklist of 72 harms spanning across the 7 domains of harm (for brevity, this checklist is designated "HC-72" within this work). This checklist was deployed in a survey of 4,000 Australian people who gamble, where the statistical approach of 'Item Response Theory' enabled the researchers to locate each of the harms along a continuous scale of 'severity' (used as the basis of the 'severity' on our item maps[6]). For reference, this data is repeated in the first few columns of the table in Appendix C, where it can be seen that the 'severity' of various harms are rational and coherent, moving (for example) from low-level harms such as 'reduction of my available spending' at the low end of the financial harms, through to 'bankruptcy' at the very highest end.

Whilst this checklist itself is overly long and burdensome for routine use, it has since been used to underpin several shorter measurement tools for GRHs. Here, the same CQUniversity research team that first developed the SGHS-10[15] (10 item version) more recently developed a 20-item version (SGHS-20), along with a 10 and 20 item version measuring harms to affected others (SHGS-10-AO and SGHS-20-AO)[17]. These are mapped against the Langham framework

[6]See Appendix C.

in Figure 8[7]. The original SHGS-10 is the most widely adopted tool for measuring GRHs, and has now been used in over a dozen studies[11], and translated into several languages[17].

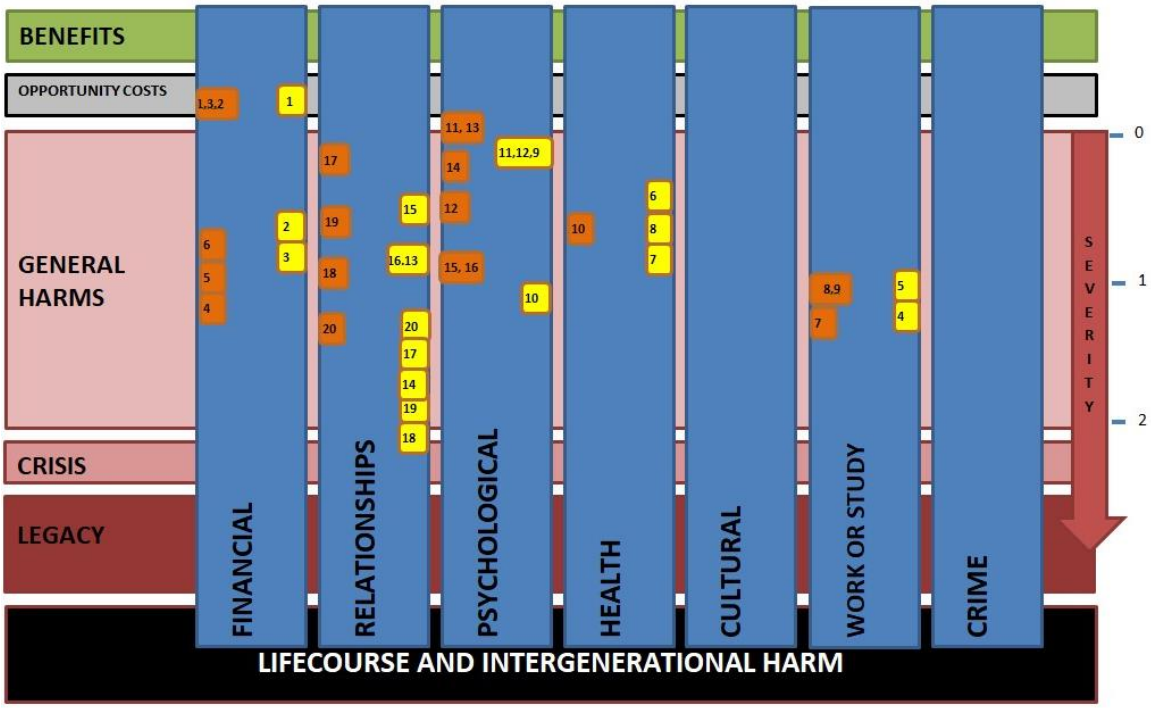

Figure 8. Mapping the SGHS-20 scales against the Langham GRH framework. Orange = questions for people who gamble; Yellow = questions for Affected Others. The SGHS-10 scales are a subset of items from the 20 item versions; see Appendix B.4.

Early research utilising the 72-item checklist and the SGHS helped establish evidence for the so-called 'prevention paradox': where the majority of harms from gambling appear to be attributable to those with lower risks of gambling problems (due to being a far more populous group), rather than the small minority with more serious gambling problems[14]. This contention, however, still represents something of an unsettled academic debate: it has been argued that by setting a low enough bar for gambling harms, the prevention paradox can always be confirmed[55]. In this way, the societal impact of gambling harms may become exaggerated.

Indeed, as illustrated in Figure 8, the least severe of the original SGHS-10 items arguably represent 'rational opportunity costs', rather than genuine harms[25,56]. These items are: *(1) "Reduction of my available spending money"; (2) "Reduction of my savings";* and *(3) "Less spending on recreational expenses, such as eating out, going to movies or other entertainment".*

It is such observations that have prompted further developments in the measurement of GRH. Here, the 'Unimpeachable Gambling Harms Scale' was specifically designed to address such criticisms[50]. Something of a "one-off" tool, it was used to establish that even the suspect items of the original SGHS-10 were highly correlated with "unimpeachable" gambling harms. All these "harms", the authors argue, thereby represent a single, unidimensional scale.

[7]This might be considered something of a circular exercise, as the SGHS is derived from the Langham framework. Nonetheless, the map in Figure 8 does still reveal potential gaps in both domain coverage and severity of the SGHS.

Other research with such instruments is starting to reveal the way that harms manifest beyond individual crises points. Here, research indicates that there are commonalities between harms experienced by people who gamble and those around them, where affected others experience perhaps half the aggregate harms as people who gamble themselves[47], with the harms persisting in both people who gamble and affected others long after behaviours have changed. These harms have surprisingly long legacy impacts, reported to have an average 'half-life' of four years; at which point harms are still experienced at half the level as during an earlier point[57].

Within the UK context, the 72-item checklist has underpinned the recent development of harms measurement, within the upcoming Gambling Survey for Great Britain, delivered by the Gambling Commission[18]. As a new component of a larger survey, this set of items does not have an official name, and we herein refer to these 13 items as the 'NatCenGH-13'. One unique feature of the new Gambling Commission harms survey approach is that the very same items are matched for both people who gamble and affected others (see Figure 9). Data and results from the updated version of this survey are forthcoming, where the experimental statistics phase has been recently published[58,59]. The 72-item checklist has also underpinned the development of an 18-item version, validated within a Finnish population[60].

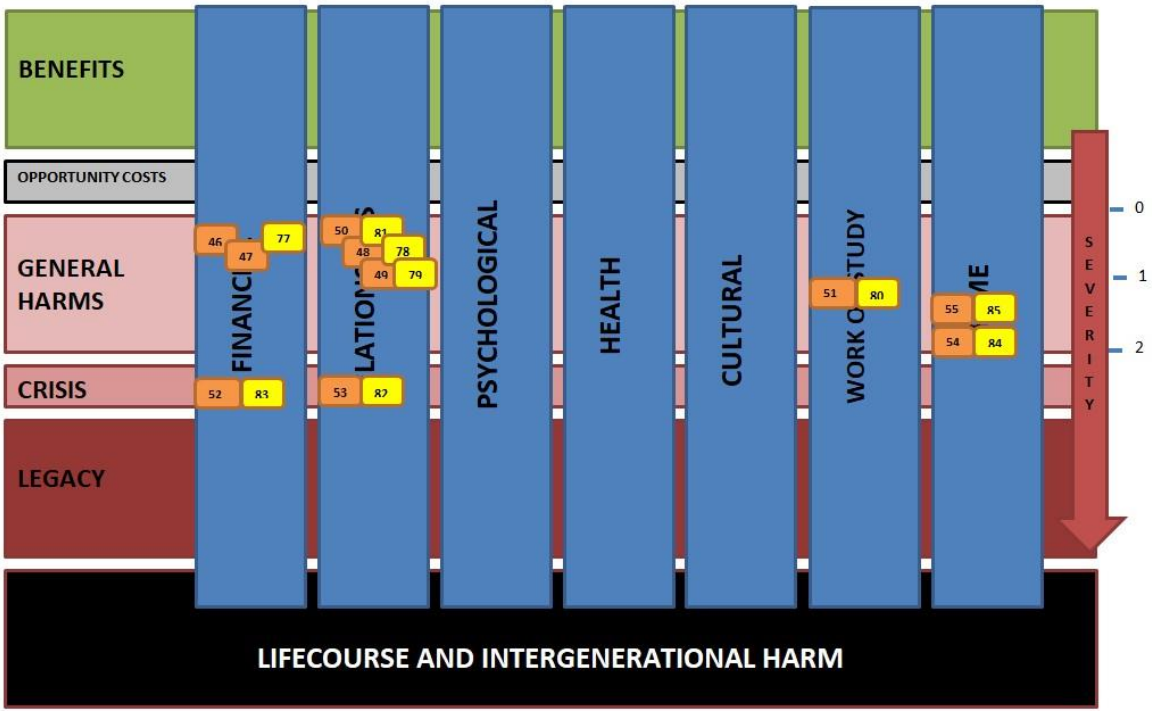

Figure 9. Mapping the NatCenGH-13 items against the Langham GRH framework. Item severity locations approximate. PGSI Items are also included in this survey, but are not shown above (see supplementary information). Harms from the perspective of the gambler are provided in orange boxes; matched from the perspective of affected significant others in yellow. Severity levels for affected others are assumed from those derived for people who gamble.

4.3.3 Objective and observational measurement of harm

Some approaches to measuring GRH take a broader view of harm, moving beyond self-report measurement, and instead aim to quantify harms using objective or observational 'hard' indicators such as divorces, bankruptcies, or suicides. Sometimes, these have been aggregated to produce population level estimates of the societal costs of GRHs.

The indicators are derived from a heterogeneity of different sources, each having different nuances for collection, analysis and interpretation depending on the specific context; with this diversity reflecting a variety of research priorities. However, the Wardle 'Framework for Action' links harms frameworks with such measurement, providing illustrative examples from various domains of harm, each with pragmatic and actionable approaches for measurement[35]. This work lists several 'foundational' metrics, identified with the Gambling Commission and GambleAware as the most promising metrics to start attributing social costs to GRH.

Within the 'resources' domain, for example, they suggest that gambling survey data on job losses and benefit claims could be extrapolated based on national data, and thereby obtain population level estimates. Crimes could be investigated by 'scraping' court records. In the 'health' domain, mental health issues might be interrogated via the Adult Psychiatric Morbidity Survey (APMS), the Quality Outcomes Framework (QOF), or Hospital Episode Statistics (HES).

The array of statistics highlighted by the Wardle framework overlaps somewhat with various costing frameworks that have been proposed and attempted internationally[61,62] (albeit North American and Australian research often has a heavier focus on the economic impacts of first-nation casinos).

Following notable and well-cited studies in Australia[63,64], the first UK attempt to estimate the "excess fiscal cost" to government from GRH was attempted in 2016[65]. The work involved pragmatic analysis of available academic literature and secondary data, estimating excess fiscal costs to the state of between £276 million and £1.23 billion. However, the authors noted the large uncertainty around these costs. For instance, health costs relied on decade-old data; statistics such as crime, housing and welfare were restricted to only specific, recorded types; the underlying data used various convenience samples; assumptions were made about the various costs to state.

Other, similar attempts have more recently been conducted in the UK. Here, Public Health England (PHE) – as part of a gambling-related harms evidence review – published an economic and social costing of harms[66]. The original version of this report (published in 2021) placed the economic burden on the UK at £1.27bn. However, the original report received a series of criticisms concerning mathematical underpinnings, including the assumptions used, inappropriate extrapolations (e.g., using overseas data), and factual inaccuracies (in estimates of suicide mortality). The report was withdrawn, revised, and republished in 2022 by the Office for Health Improvement and Disparities (OHID). The revised estimates – now placing the burden at between £1.05-£1.77bn – remain subject to further critiques[67]. Whilst such criticisms are aligned with a gambling industry agenda, such episodes nonetheless highlight the fraught challenges of extrapolating economic costs from a muddled collection of data sources.

Such challenges had already been highlighted. A report from McDaid and Patel from 2019 – which explicitly built upon the Wardle 'Framework for Action' – combined a scoping review with expert interviews and surveys, aiming to investigate the strengths and weaknesses of such approaches to quantifying social costs[35]. The work identified 112 different publications looking at ways to cost harms linked to gambling. The report suggested that job loss, bankruptcy and benefit claim data seemed the easiest to measure for survey respondents and mental health data was the hardest to measure and attribute to gambling. Moreover, the report highlights that such data is largely correlational, and that these types of cost-estimate exercise make unproven assumption of directional causality between gambling harms and state costs.

Additionally, such approaches are entirely blind to the 'counterfactual', where these costs might have been incurred anyhow, even if gambling had never existed. In other words, even with gambling taken out of the equation, a person might still have encountered harm, perhaps through increased engagement with other potentially harmful behaviours, such as alcohol or drug use. By ignoring such counterfactuals, the societal costs of harms can become exaggerated. Such counterfactuals are often discussed in reference to suicide data, where it is often difficult to isolate gambling as a singular causational factor[67]. Instead, some unknowable proportion of those suicides might have occurred, even without gambling harms ever having been experienced.

Finally, these types of cost estimates need to be wary of conflating the harms experienced with the costs to society, and may be liable to overlooking and peripheralising harms that are difficult to attach cost estimates to. Nonetheless, from a policy perspective, it is valuable to recognise the social costs of gambling to society as a whole to inform appropriate policy responses.

With the use of observational data being so fraught, the McDaid and Patel report highlights other routes forward. Here, high-quality longitudinal data can more readily account for issues such as causality. Furthermore, with a rise in publications using life and wellbeing instruments for measuring GRH, the report also suggested modelling methods that have been widely used in public health economics. Such approaches have been deployed for substance and alcohol-related harm and have utility for estimating the costs of harms and determining the cost effectiveness of harm reduction approaches. Recent developments in such health economic approaches are discussed in the following section.

Finally, with observational data, there was a distinct and unique approach identified in our 'core texts' that sits aside from other works. This research involved analysis of 6.5 million anonymised accounts from a major UK retail bank, from over a 7 year history, investigating associations between gambling activity and expenditure correlates of financial, social and health activities[68]. The findings revealed associations between gambling and financial distress, alongside negative lifestyle, health, well-being, and leisure outcomes. Whilst still purely correlational, the approach does avoid some of the questionable assumptions and extrapolations of other datasets. Moreover, it provides a large-scale, nationwide perspective on gambling expenditure and any shifts in long-term associations with harms outcomes; whether they be worsening or improving.

4.3.4 Health economic assessment of harm

A key outcome measure in health economics is the 'QALY': Quality Adjusted Life Years. These can be calculated through various approaches, where QALYs run from 0 to 1: a value of 1 is equivalent to a year spent in perfect health; a value of 0 is equivalent to death.

Once calculated, these values can be used to inform health-related economic decision making. In England, for example, public health interventions costing less than £20,000-30,000 per QALY gained have a reasonable chance of being recommended by the National Institute for Health and Care Excellence (NICE)[69]. These approaches are also used to estimate decrements in health-related quality of life (often abbreviated to HRQoL) in 'Global Burden of Diseases Studies'[70] for various long term conditions, psychiatric conditions, alcohol use and opioid dependence. Now, they have also been applied to GRHs[27].

Following the development of the Langham conceptual framework, decrements of health-related quality of life were estimated for different levels of problem gambling status (i.e., from the PGSI) and different levels of GRHs (i.e., from the harms checklist). Using standard health economic protocols (see Box 1) the study concluded that the PGSI 'low-risk', 'moderate-risk', and 'problem gambler' in Victoria suffers average health-related quality of life decrements of .13, .29, and .44. This suggests that gambling problems are comparable to major depressive disorder and alcohol dependence and harm. Furthermore, the results also confirm the 'prevention paradox', where aggregate harms accruing to "non-problem gamblers" (who are far more common) exceed those of "problem gamblers", suggesting that 50%, 34%, and 15% of the total harm from gambling in Victoria are observed among low-risk, moderate risk, and problem-gamblers, respectively. Similar protocols have been used to estimate costs of gambling harm in New Zealand[71] and Tasmania[72], with broadly similar results.

Box 1: Health economic methods for estimating 'QALYs' (Quality Adjusted Life Years) lost from GRH.

Direct elicitation method (of Browne *et al*., 2016). In this approach, 'pen portrait' vignettes of various gambling harm experiences were constructed, where survey data from the harms checklist enabled representative "vignettes" to be written from right across the observed spectrum of harm. These vignettes were then deployed in two well accepted health economic approaches for calculating QALYs: the Time Trade-Off (TTO) method and the Visual Analogue Scale (VAS)[1]. With the TTO approach, a panel of individuals are asked at what point they would be indifferent between living for a longer amount of time with specific health issues (in this case, gambling harms) versus living a shorter period of time in perfect health. In other words, individuals are asked how many years of life they are willing to sacrifice to live with a poorer quality of life. With the VAS approach, individuals are asked to rate different health states on a scale from 0 (death) to 100 (perfect health), placing and contrasting the vignettes of gambling harm against various health problems with previously-determined QALYs.

The indirect elicitation method (of Browne *et al.*, 2023) There were concerns that the TTO and VAS exercises may over-estimate QALYs lost from gambling: respondents in the rating exercises may overestimate the effects of gambling (due to the societal stigmatisation of gambling), leading to upwards bias, thus rendering the perceived social costs of gambling larger than they truly are (see Browne *et al,* 2023)[17].

Therefore, an alternative "*indirect elicitation*" protocol – which is not liable to the same biases – has been proposed. This involves survey approaches with standardised health-related quality of life questionnaire tools, followed by statistical modelling to benchmark these against instruments such as the PGSI or SGHS. Known risk factors for experiencing GRH are accounted for by weighting, and comorbidities (that might confound the effect of GRH on health-related quality of life) are controlled in multivariate statistical models. Such an approach requires detailed knowledge about the relative risks for experiencing GRH, alongside rates of comorbidities. However, these have been recently enumerated from reviews and meta-analysis (see Browne *et al.,* 2023), providing the substrate for this indirect elicitation method.

More recently, an alternative approach has been developed for evaluating such health-related quality of life decrements of gambling harms[73]. There have been concerns that the previously used approaches may over-estimate QALYs lost from gambling:, thus rendering the perceived social costs of gambling larger than they truly are[17]. Therefore, an alternative "*indirect elicitation*" protocol – which is not liable to the same biases has been proposed (see Box 1 below). Using this more conservative approach, the CQUniversity team re-estimated decrements to health-related quality of life from gambling issues, this time finding lower decrements according to PGSI: .005 for low-risk (a non-significant finding); .051 for medium risk and .99 for high risk. Analysis was also conducted using the SGHS. Here, the results revealed that even the lowest level of harms had significant decrements to health-related quality of life results (in contrast to the PGSI). Moreover, the SGHS identified fewer people who gamble 'at risk' of harm than the PGSI. In other words, the SGHS appears to be more closely linked with reduced health-related quality of life, and is a more specific and precise measure of harm, yet without 'lowering the bar'[8]. In contrast, the PGSI may not be a reliable indicator of GRH in community samples[74].

Overall, health economic approaches are gaining increasing traction within gambling literature, where the use of standardised health and wellbeing measures (such as SF-12 or SF-6D) have previously been recommended in the UK context[75]. Benchmarking to decrements in health-related quality of life will enable standardised health economic approaches for the evaluation of interventions and service delivery. From the above methods, the more conservative indirect elicitation is currently recommended[17].

4.4 Subject Matter Expert workshops: implications for the measurement of harms

Within the workshops, after discussing frameworks of harm (where results were presented earlier, in section 4.3), we presented a lay-friendly version of results around measurement of harm, followed by a structured discussion which aimed to critique any gaps and limitations in harms measurement. This was followed by a discussion of the best next steps for research and harm minimisation. Several key themes were elicited which are outlined below.

Workshop participants who were involved in the delivery of services were asked about the measurement tools they were currently using for GRH. The services represented in our workshop were using PGSI and CORE-10[76] (for psychological distress), with the Gambling Recovery STAR[77] also used to measure recovery (it is visual and allows people to track progress). Treatment services were currently using in-house, self-developed triage systems based on gambling activity and frequency and felt that a new validated and published approach would be welcome and useful.

[8]See, in particular, p69 of Browne 2023

Workshop participants discussed the challenges and merits of different measurement tools and highlighted several issues with current approaches:

- Due to the 12-month recall period, PGSI is not adequate for measuring legacy harms, the questions ignore marginalised/underserved communities, and it doesn't measure recovery;
- Many measurement approaches focus on more 'extreme' harms (e.g., debt, relationship breakdown, job loss) but shame and stigma are huge sources of harm which measurement approaches should capture. Participants highlighted feelings of shame, guilt, and embarrassment as ways to measure stigma as a gambling harm;
- Participants felt that there was too much focus on financial harms in current approaches and felt that although financial harms are often the starting point of GRH, emotional/psychological distress can often be the most enduring.

Despite these identified gaps, an academic expert noted that the measures and GRH questions are all highly correlated and when trying to score an 'index of harm', the actual harm items are not important. They felt that regardless of the harms questions asked, similar levels of harm are likely to be indicated. Participants also discussed the significance of language in measurement tools and the role that language can play in re-enforcing stigma, highlighting that there is a potential for questions themselves to be stigmatising. It was felt that this could influence accurate responses and disclosures, and thereby undermine the integrity of responses.

Workshop participants were asked to consider the future of gambling harms measurement and raised a number of suggestions:

- Participants highlighted the WHO "ASSIST" tool (for harm related to drug use) and the "AUDIT" tool (for alcohol) as useful non-stigmatising 'brief intervention' tools which look at risk exposure and impacts. The tools provide scores which can also be used to monitor improvements. Participants felt that a similar brief intervention tool could have utility for gambling harm measurement and support services;
- With regard to future measurement, the development of a 'Computer Adaptive Test' (CAT) was discussed. This is an approach for questioning presented via a computer/tablet/phone, with subsequent questions tailored from previous responses, enabling better targeting of questions (i.e., high severity items such as bankruptcy are only presented to those who have indicated more severe financial harms). This would enable more accurate data, yet with fewer questions being asked. With an increasing focus on digital services and remote service delivery, the idea of a CAT-based measure for GRH was generally deemed to have utility and validity, as it would help avoid a 'one size-fits all' approach to measurement.

Overall, newer measures for GRH (such as the SGHS or the new items within the upcoming Gambling Commission annual survey) were deemed useful and relevant. Nonetheless, ongoing work should aim to continue operationalising improvements in the underlying frameworks of harm into measurement tools that have increased accuracy, robustness and utility. In particular, one next step highlighted was adapting the research for real-world monitoring of *recovery* from GRH. This would have utility for service users and service evaluations alike.

5 Discussion

5.1 Frameworks for Harm

The last decade has seen substantial developments in the conceptualisation of gambling harms, where several frameworks have been developed. We have established that the most comprehensive of these is the 'Langham' Framework, developed at CQUniveristy in Australia, where its development was underpinned by literature reviews, qualitative interviews with people who gamble and affected others, focus groups, analysis of forum posts, and interviews with professionals.

This framework is complemented by a number of others, each with slightly different aims and emphases. The Abbott framework, led by GREO in Canada, was a direct contrast to all the others: rather than being a framework of harms *outcomes*, it primarily encapsulates the underlying *drivers* of harm, such as underlying psychological factors or exposure to gambling environments that are linked with harm. The UK-focused Wardle framework for adults and Blake framework for children and young people were pragmatically developed with the goal of operationalising harms measurement (via a range of approaches, including self-report tools and costs to society). The Latvala framework synthesised work from various strands, producing an integrated framework that mirrored both harms and benefits (such as increased employment, social activities, tax revenue, etc.).

Despite these differences, the frameworks themselves have much in common. Their constituent domains are largely overlapping (i.e., financial, relationship, physical, psychological, social etc.), with spectrums of severity that range from common, low-impact harms, though crises, and onto ongoing, legacy, and intergenerational harms. Whilst each framework might be presented slightly differently and 'repackaged', they were largely assessed by our SME workshop participants as comprehensive, logical, and understandable. The domains also correlated well with those identified in a recent systematic literature review of gambling harms[19].

Nonetheless, we identified areas where further framework expansion is necessary. Here, the ongoing, iterative nature of the Abbott framework (now onto its third edition) was noted, which reflects the evolving nature of both scientific evidence and the society that it observes. This notion of an iterative framework mirrors developments elsewhere. Here, 'open science' models are now becoming the norm for ongoing, collaborative knowledge generation[78] – for example, with the proposal of an open definition for behavioural addictions[79].

Looking forward, such an integrated framework should encapsulate the drivers of harms (i.e., from Abbott), alongside the outcomes of harm (i.e., Langham). Moreover, our work identified a need for purpose-designed gambling recovery frameworks. Such a development, we would argue, would consolidate the *causes, consequences,* and *recovery* of GRH within a single, coherent framework.

Our research also identified other areas where further conceptualisation warrants attention. These include more lived experience input of how harms manifest specifically in the UK context; the role of ethnicity and gender; the role of stigma in mediating harms as well as a harm in itself;

a more nuanced perspective on affected others; and the impacts at different developmental stages for children and young people.

5.1.1 Adjacent sectors

With regard to frameworks from adjacent sectors (notably drugs and alcohol), these conceptualisations were not as comprehensive or advanced as with GRH, but did raise some considerations. At first glance, this finding might seem counter-intuitive: after all, public health approaches for drug and alcohol harms were commonplace long before gambling. On further appraisal, however, this observation is perhaps not as surprising as it might first appear, and is likely due to a combination of factors. The stigmatisation and illegal status of drugs may hamper research, and with research on gambling harms having been conducted more recently, it has been produced in a research environment of increasingly rigorous and robust protocols for qualitative work, lived experience input and conceptual development.

Nonetheless, lessons should still be learnt from adjacent fields. Work on drug related harms does highlight the consequences (both intentional and unintentional) of how harms are mediated by policy action, and may result from illegality rather than from the actual drug use itself[38,42]. Such observations highlight the importance of policy, and how choices around prohibition and regulation involve complicated trade-offs amongst various competing goals and socio-political viewpoints. Furthermore, it has been argued[42] that 'neo-liberal western societies are arguably the worst for victim-blaming' – an argument that mirrors recent commentary around the stigmatisation of gambling[49], where gambling harms have been historically defined by individualistic and clinical definitions; encapsulated by tools such as the PGSI.

A more thorough appraisal of GRH via a socio-political lens is warranted; where (similar to the drugs literature) the appraisal of gambling harms needs to explicitly acknowledge our shifting political paradigms. Over history, these have ranged across a spectrum from moral purism, through various incarnations of strong and weak paternalism, to free-choice liberal absolutism[38]. The political environment has implications for the way harms manifest. They also have implications for how, as a society, we intend to study, measure and reduce these harms. Gambling research should endeavour to explicitly acknowledge the biases and preferences within which it operates. Research priorities are a statement of political intent.

With numerous unintended consequences of policy and legislation highlighted within the drugs literature, it has been suggested that *harm reduction* (i.e. through better education, improved self-efficacy, and safer usage) might sometimes be a more achievable goal than more direct attempts to *stop or reduce overall engagement* in potentially dangerous activities[38] – an idea which may merit further consideration within a gambling context; especially with emerging evidence establishing that gambling harms are a more specific decrement to health-related quality of life than gambling behaviours (as measured by tools such as the PGSI[17,27]).

The idea of adapting the MCDA expert workshop approach of 'weighting and rating' GRH was discussed in our SME workshops. This could involve a rating and comparison of various gambling products. However, this was not widely endorsed in our SME workshops, where participants cited a lack of direct utility (for service delivery contexts, at least). There were also questions around unintended consequences, such as misdirection of effort towards products rather than underlying problems. It should be noted, however, that our workshops lacked policy

or regulatory experts, and this is an area where such an approach may leverage the greatest value. We believe that further consideration of such an approach is warranted, especially via further exploration of the utility of such an approach for informing policy or regulation.

5.2 Measurement of Harm

Developments in the measurement of GRHs have flowed directly from the developments in the underlying frameworks. These innovations have included self-report measures for GRH, attempts at societal economic costings for GRH, and attempts at aligning GRH with standardised health economic approaches.

5.2.1 Self-report measurement

Recent developments of self-report measures of GRH have been largely underpinned by the robust Langham framework. As a starting point for the development of measurement instruments (formally known as 'content development'), such a framework would appear to largely align with modern scientific protocols: the sorts of rigorous criteria now demanded before (for example) self-report instruments are deployed in high-stakes clinical trials[23,24]. The same, however, cannot be said of entrenched measurement tools within gambling research (i.e., such as the PGSI or South Oaks Gambling Screen). The development of these specialised tools for gambling harms has enabled the research to move beyond clinical categorisations that conflate harms with the sources of those harms.

In particular, tools such as the SGHS (in its various guises) can provide accurate population-level summaries of where the burden of harm is carried, and serve to integrate gambling research with the broader field of public health[11]. Here, early work has suggested the existence of the 'prevention paradox': where, on aggregate, the larger burden of harm may fall upon the majority of individuals with lower levels of gambling harms. This suggests that broader public health interventions, targeting a broad spectrum of the population – as seen, for example, with alcohol and smoking harm prevention – are also warranted for gambling.

Other research on GRH is starting to reveal the way that harms manifest beyond individual crisis points, where affected others have experienced on average half the harms as those who gamble[47], and harms persisting in both people who gamble and affected others long after behaviours have changed[57]. Nonetheless, it was highlighted in our SME workshops that more needs to be understood about the long-term psychological impacts of stigma and the discrimination it causes. Similarly, whilst impacts on affected others have been unravelled more fully in the alcohol literature[39], they remain coarse-grained within the gambling literature.

We are only at the start of this research trajectory. Nonetheless, these early findings simply would not have been possible without new forms of measurement; ones that focus on harms rather than behaviours; and also broadening the focus to affected others.

Our mapping exercise: gaps in GRH measurement

We mapped some exemplar GRH instruments against frameworks of harm, where the results reveal the evolving nature of the field. Whilst there has been a recent expansion in the measurement of GRH, current measurement tools vary in their coverage of domains of harm.

Overall, financial and relationships harms tend to be most consistently measured. The SGHS-20 (see Figure 8) also extends well into psychological harms; and covers some health and work/study harms. In contrast, the NatCen-GH13 (see Figure 9) overlooks the psychological and health elements, but instead has some items on work/study and crime. Current 'blind spots' tend to be related to health, work/study, crime and (especially) culture. This likely reflects the lower quantity of primary research on such harms; a fact noted by developers of underlying frameworks[32].

Furthermore, coverage of items is patchy across the severity of harms, especially at either end of the scale – i.e., both the crises/legacy impacts, as well as the benefits side of the ledger (which remains unmeasured). Similarly, closer attention needs to be paid to language used at the borderline between opportunity costs and true harms. Here questions such as "less spending on recreational expenses…" represent perfectly legitimate consumer or leisure choices for people who live within consumer-capitalist societies.

Future developments in the measurement of GRH

Appropriate measurement is defined by the aims and context of measurement. Some contexts require customised approaches. With gambling harms, an ongoing expansion of frameworks, instruments and items may be useful for *some* goals, especially around basic research, and knowledge generation – for example, when researching affected others.

However, other contexts – for example, service delivery – might be wary of 'survey fatigue'. Nonetheless, our SME workshops highlighted a desire for focused development of recovery frameworks and measurement, which have direct utility in their environment. Furthermore, it is known that the majority of people who recover from serious gambling harms currently do so without assistance from service and healthcare provision[80]; understanding how they succeed should, in turn, inform intervention development and provision. Those who recover report that gaining insight into their behaviours helped them manage urges and gain self-control over their behaviour[81]. Cognitive Behavioural Therapy or Motivational Interviewing are recommended as interventions[82,83], similar to harm related to substance use. However, both can be demanding of resources, and their effects may be short-term. Therefore, optimal ways of delivering the effective components of these interventions need to be evaluated in the reduction of GRH over longer timeframes, alongside potential improvements of Motivational Interviewing such as Functional Imagery Training[84]; established to have long term effects in weight-loss that may also be effective in reduction of GRH. Here, the adoption of a health economics view of GRH is an essential step in comparing and justifying different interventions. It has been recently recommended[82] that future treatment evaluations should examine longitudinal associations between psychological symptoms, GRH, and quality of life – exactly the sort of toolkit outlined below.

Consolidating measurement of GRH

The ongoing evolution and multiplication of harms measurement does lead to one final problem: *how can these various disparate strands be coherently integrated and rationalised?* This isn't some abstract problem, to be solved at some unspecified time in the future. Instead, the UK and

Australia – with the SGHS tools and the NatCenGH-13 – are already taking divergent approaches, deploying different sets of measurement items.

Here, technical advances in measurement offer readymade solutions. Initiatives such as PROMIS and NeuroQoL have produced 'item banks' of questions, used for measuring the impacts of various long-term health conditions[85,86]. Here, statistical approaches such as Item Response Theory and the closely related Rasch Measurement Theory can be used to 'calibrate' items, so that they all are mapped onto a single spectrum of continuous measurement.

Such an approach is not unprecedented within gambling research. For example, items from various gambling instruments such as the PGSI and others have been shown to lie on a single continuum of severity, albeit with most of the questions confined to a narrow band[87]. Such an observation reiterates the need for more items at the severity extremes, and it is exactly these sorts of issue that Item Response Theory and Rasch Measurement Theory are designed to diagnose and remedy.

The Item Response Theory approach underpinned the development of the 72-item bank of the Harms Checklist, along with the derived short-form SHGS tools. However, there are no theoretical constraints against further item banking, which would naturally develop with any future expansion of the underlying frameworks.

Whilst standardised tools (such as the SGHS) will normally be appropriate for most circumstances, what could unify this with other, more bespoke approaches, is the notion of a 'harm index' or 'harm proxy', which positions all items along the severity spectrum. An example of such a harm index (the 'severity'. applied to the 72 items of the checklist) can be seen in the first few columns of the table in Appendix C.

Most importantly, this 'harm index' applies not just to the items, but also to individuals, who can be ascribed a score – analogous to a score on the PGSI – which can then be aggregated at a population level. This harm index can also be readily mapped to health-related quality of life decrements (as has already been done[17]; see Figure 10 and Appendix B.4), thus directly aligning gambling measurement with the public health agenda. Even historic harms questions (e.g., from the PGSI) could be integrated onto such a harm index, thus offering the possibility of backwards compatibility and integration. In this way, a harm index rationalises the disparate harm measurement approaches (e.g., in the UK versus Australia) with historic approaches.

There is a final advantage with item banking and Item Response Theory/Rasch Measurement Theory based approaches. They can be used to develop 'Computer Adaptive Tests' (CATs), where questions are delivered on an electronic device (e.g. personal phone, tablet, etc.), and questions tailored based on previous responses[88]. This enables more robust measurement yet asking fewer questions. Better still, it can appropriately target items at the high-end of the severity spectrum – such as bankruptcy or attempted suicide – which are rarely asked within

national surveys due to their relative scarcity. In this way, CATs can enable more sensitive and specific measurement right across the severity of harms[9]

5.2.2 Objective and observational measurement

Demonstrable indicators of harm

Approaches to measuring GRH that take a broader view of harm, using 'hard' (i.e. observational or objective) indicators such as divorces, bankruptcies or suicides have gained increased attention over the last couple of years. Here, they have been utilised in studies aiming[19,66] to inform the UK Government Review of the Gambling Act[89]. Whilst such data makes powerful policy statements – especially around estimates of aggregate fiscal expenses from GRH – this work has also highlighted some of the challenges with such a heterogeneity of contextually dependant sources, which may limit their utility for routine use. Moreover, such approaches are blind to more nuanced and subjective harms, such as stigma, psychological wellbeing and degradation of family dynamics.

Bank accounts as a proxy for harm

One distinct approach, however, that stands aside from the others is the analysis of bank account data, avoiding some of the questionable assumptions and extrapolations of other datasets, and providing a large-scale, nationwide view on gambling expenditure and any long-term trends with worsening (or improving) outcomes. Such an approach may offer novel "top down" monitoring information, naturally complementing data such as the annual Gambling Commission survey[10].

Nonetheless, whilst such objective measures (i.e. including banking data and other observational datasets such as divorces, bankruptcies and suicides) can give a useful 'top down' perspective, they are limited by a number of shortcomings. They are usually anonymous and cannot be used for monitoring individual progress and treatment outcomes. They are purely correlational and can say nothing about the complex interrelationships between factors like mental health and gambling harms. Finally, they cannot consider the counterfactual: i.e., even if gambling had never existed, the harms may have somehow manifested anyway; perhaps via other forms of risky behaviours.

6.2.3 Health economic approaches

A number of approaches have now been developed to align gambling harms more closely with standardised health economic approaches where it has been argued that "gambling harm is best understood as a decrement to health utility"[73]. Initial approaches used standardised protocols such as the Time Trade-Off method or Visual Analogue Scales, enabling decrements to health-related Quality of Life to be calculated for GRH. This has revealed that the impacts on

[9] And thereby offer advantages over more limited approaches to adaptive tests, which contain only a limited number of 'screener' questions to target later questions.

[10]Such an approach, however, would require novel data-sharing agreements, which might be challenging from both a technical/legal perspective and also from an ethical/political perspective. The data-sharing agreement for the existing publication cannot be extended or renewed, although other work has successfully used a similar approach: https://www.bi.team/blogs/dealing-new-data-what-bank-transactions-can-tell-us-about-gambling-behaviour/

quality of life from severe gambling harms may be comparable to major depressive disorder and alcohol dependence.

However, due to possible upward biases in these approaches (they may overestimate harms, due to response biases of research participants), more recent work has deployed an approach where instruments such as the PGSI or SGHS are “grounded” to standardised health-related quality of life questionnaires (see Appendix B.4 for an example of this), termed an “indirect elicitation” approach. This is achieved by statistical methods that account for relative risks of GRHs alongside known health comorbidities and harmful activities.

With such health economic approaches gaining increasing traction, the use of such standardised health and wellbeing measures has been recommended in the UK context[75]. The more conservative indirect elicitation for calculating health-related quality of life decrements is currently recommended[17].

An increasing familiarity and acceptance of such approaches could help integrate GRHs more closely with other public health initiatives[90]. For instance, grounding changes in tools such as PGSI and SGHS to decrements in health-related quality of life[91] will enable standardised health economic approaches to be deployed in the evaluation of interventions and service delivery. This can, for example, assess the cost-effectiveness of gambling harm interventions, helping establish that they provide “value for money” from the perspective of national health economics, thus supporting future procurement and commissioning decisions.

6 Conclusion and recommendations

The last decade has seen substantial developments in the frameworking and conceptualisation of harm. These developments have flowed directly into improvements in systematically measuring these harms. These new perspectives move beyond entrenched and often binary, clinically-derived definitions of gambling. As a consequence, they have started to unravel the nuances of how harms can manifest across numerous domains of life, often with substantial impacts on affected others.

Such research, however, is still in early stages. The continued move towards a public health paradigm – where these structural shifts can often take decades – will require ongoing support in the development of underlying tools and expertise. Nonetheless, such work should ultimately prove self-justifying: by understanding the 'who, what, where and how' of gambling related harms, benefits for society can be most effectively leveraged. Our review results in a series of related recommendations, which are necessary to move away from historic and stigmatising conceptualisations, align gambling with public health methodologies elsewhere, and enable a full understanding of gambling harms and how they can be best targeted and reduced.

6.1 Recommendations for frameworks of harm:

- Whilst the Langham framework is sufficient for many purposes, frameworks for GRH should be supplemented by further research, so that they fully represent the harms experienced by specific cohorts and sub-groups. Further qualitative research (such as interviews and thematic content analysis with people experiencing GRHs and affected others) should investigate: the nuances of harms experienced across different ages of children and young people; the perspectives of different affected others; experiences of those with protected characteristics; the impacts of stigma; and the specifics of the UK cultural context, including different ethnic minorities;
- Further research is required into putative benefits of gambling. Whilst frameworks such as the "PHIGAM framework" of Latvala et al., recognise that many harms are balanced by opposing benefits, these remain largely conjectural and are rarely studied. Nonetheless, to appropriately assess impacts of gambling, the "positive" side of the "ledger sheet" cannot be ignored. Such a research agenda should not be misinterpreted as pandering to an industry agenda. Instead, a full understanding of the personal and socioecological factors that differentiate harms from benefits – alongside better differentiation of the "grey area" of opportunity costs, situated in the middle ground – would enable a clearer perspective on how and why harms manifest;
- Our work with Subject Matter Experts highlighted a need a need for specific validated recovery frameworks for GRH, analogous to those used in mental health services which can be used simultaneously as a counselling tool, for monitoring individual recovery, and for service-level evaluation through data aggregation;

- New findings should be integrated with previous research findings and frameworks into an iterative, ongoing framework. This would synthesise the drivers of harm, outcomes of harm, and recovery from harm into a single framework, reflecting the nuances of different cohorts and affected others. This would align the conceptualisation of gambling harms with modern 'open science' approaches, which explicitly acknowledges the ongoing, evolving nature of science and the society it studies. This fuller conceptualisation of harms should be placed central to future research, and be used to systematically inform any future measurement.

6.2 Recommendations for measurement of harm:

- New modes of measurement, moving beyond the PGSI, need to become commonplace and routinely used in various contexts from basic research through to national monitoring. This will enable the field to move away from anachronistic measurement tools that conflate harms and behaviours, which are often used to produce stigmatising "problem gambler" labels onto individuals;
- For routine use, tools such as the Short Gambling Harms Screen (SGHS) or the newly developed harms questions in the upcoming Gambling Commission annual survey will suffice;
- This proliferation of harms measurement needs to rationalised by using standard statistical approaches such as Item Response Theory. This would enable a standardised 'harm index' to be generated from various questionnaires approaches, and provide backwards compatibility with historic measurement such as the PGSI. This 'harm index' could act as a replacement for PGSI scores, used for monitoring the level of harm encountered in everything from individuals right through to whole populations;
- This harm index needs to be calibrated or 'grounded' to decrements in health-related quality of life. The deployment of such health economic approaches in the UK would be an important step to integrating gambling into a public health paradigm, where (from a range of possibilities) indirect elicitation is the most currently favoured approach. Such standardised public health approaches would enable targeting interventions for the highest overall impact on quality of life;
- Alongside such developments, we recommend development of a 'Computer Adaptive Test'. This would enable efficient measurement on devices such as phones and tablets, and provide higher-quality data, with the specific ability to "zoom in" (when appropriate) to more rarely studied, higher severity and legacy impacts such as bankruptcy, job loss and relationship breakdown. This will enable more precise measurement, with benefits for research and harm reduction strategies.

In conclusion, a full understanding of GRH will help the field move away from arbitrary and conceptually outdated categories such as 'low risk' or 'moderate risk' gamblers. Continued investment should be made to support a new breed of tools, which have the explicit goal of identifying, monitoring and evaluating GRHs. The alignment of gambling with other public health approaches will support widespread improvements in harm reduction strategies, alongside institutional targeting and procurement of such services. Moreover, moving away from historic, clinically derived notions such as 'problem gambler' – where these definitions contribute to stigmatisation and harm exacerbation – will directly serve those people who are seeking help.

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Appendix A: Research tools

A.1 Inclusion and exclusion criteria

Criterion	Inclusion criteria	Exclusion criteria
Content	Research includes examples of: • Frameworks/ conceptual models of gambling harms • Gambling harm journeys • Longitudinal outcomes related to gambling harm Gambling screening tools • Measures or metrics for gambling harm (e.g. scales, survey questions, tools, checklists) • Frameworks/ conceptual models for analogous harms e.g. drug/alcohol /substance use (harms may be broader than harms related to dependence e.g. the harm related to criminalisation/policy) • Harms journeys for analogous harms • Screening tools for analogous harms • Measures or metrics for analogous harms (scales, survey questions, tools, checklists)	• Frameworks, screening tools or measures not related to gambling harms or analogous harms (drug/alcohol use) • Frameworks and tools only looking at risk factors for experiencing harm • Harm reduction frameworks for gambling or drug use (detailing interventions to reduce harm) • Frameworks and measurements looking at recovery from gambling harm • Studies which describe gambling harm without discussing it conceptually or presenting models/frameworks/journeys.
Types of literature	• Relevant grey literature • All types of evaluative studies • Systematic literature reviews (including scoping reviews, rapid evidence assessments, meta-analyses, narrative analyses) • Randomised control trials • Quasi-experimental studies (including cohort and pragmatic trials, case and observational studies) • Qualitative studies	• Protocols • Opinion pieces • Popular media (e.g. blogs, social media feeds and / or newspaper articles) • Methods are unclear/ are of low-quality
Date of publication	• January 2000 – January 2023.	• Any research published before January 2000.
Geography	• Prioritising UK evidence but will draw on comparable international evidence if relevant to research questions.	
Language	• English	• Not English.

A.2 Database search strings

Medline (Date searched: January 11, 2023)

1	Gambling[Mesh] OR gambling[tiab] OR gamble*[tiab]	12,142
2	harm reduction[mesh] OR harm*[tiab] OR journey*[tiab]	255,776
3	framework*[tiab] OR conceptualization[tiab] OR measure*[tiab] OR screen*[tiab] OR instrument*[tiab] OR survey*[tiab] OR index*[tiab] OR indices[tiab] OR model*[tiab] OR scale*[tiab] OR tool*[tiab] OR checklist*[tiab]	9,822,520
4	#1 AND #2 AND #3	577
5	Limit 2000-01-01 to present	571
6	Limit to English	562

1	"substance related disorders"[MeSH Terms] OR "drug addiction*"[tiab] OR "alcoholism"[tiab] OR "substance mis*"[tiab] OR "drug mis*"[tiab] OR "substance use disorder"[tiab] OR "drug use"[tiab]	350,003
2	"harm reduction"[MeSH Terms] OR "harm*"[tiab]	235,991
3	"framework*"[tiab] OR "conceptualization"[tiab]	387,954
4	#1 AND #2 AND #3	573
5	Limit 2000-01-01 to present	551
6	Limit to English	540

Scopus (Date searched: January 11, 2023)

1	INDEXTERMS(Gambling) OR TITLE-ABS-KEY(gambling OR gamble*)	26,766
2	INDEXTERMS("harm reduction") OR TITLE-ABS-KEY(harm* OR journey*)	954,979
3	TITLE-ABS-KEY(framework* OR conceptualization OR measure* OR screen* OR instrument* OR survey* OR index* OR indices OR model* OR scale* OR tool* OR checklist*)	33,192,259
4	#1 AND #2 AND #3	1021

5	Limit 2000-01-01 to present	1012
6	Limit to English	988

PsychInfo (Date searched: January 11, 2023)

1	DE (Gambling OR "Gambling Disorder") OR TI(gambling OR gamble*) OR AB(gambling OR gamble*) OR KW(gambling OR gamble*)	14,384
2	DE("harm reduction) OR TI(harm* OR journey*) OR AB(harm* OR journey*) OR KW(harm* OR journey*)	96,172
3	TI(framework* OR conceptualization OR measure* OR screen* OR instrument* OR survey* OR index* OR indices OR model* OR scale* OR tool* OR checklist*) OR AB(framework* OR conceptualization OR measure* OR screen* OR instrument* OR survey* OR index* OR indices OR model* OR scale* OR tool* OR checklist*) OR KW(framework* OR conceptualization OR measure* OR screen* OR instrument* OR survey* OR index* OR indices OR model* OR scale* OR tool* OR checklist*)	2,328,832
4	#1 AND #2 AND #3	649
5	Limit 2000-01-01 to present	643
6	Limit to English	625

Sociology Abstracts (Date searched: January 1, 2023)

1	MAINSUBJECT.EXACT(gambling) OR TITLE,ABSTRACT,IF(gambling OR gamble*)	2490
2	MAINSUBJECT.EXACT("harm reduction") OR TITLE,ABSTRACT,IF(harm* OR journey*)	27,724
3	TITLE,ABSTRACT,IF,MAINSUBJECT(framework* OR conceptualization OR measure* OR screen* OR instrument* OR survey* OR index* OR indices OR model* OR scale* OR tool* OR checklist*)	614,909
4	#1 AND #2 AND #3	48
5	Limit 2000-01-01 to present	41
6	Limit to English	40

A.3 Grey literature websites

The following websites were searched as part of the grey literature search:

- Institute of Public Policy Research (IPPR)
- Gambling Commission
- GambleAware
- NHS England
- Health in Wales
- NHS Inform
- GOV.UK
- GREO
- GamCare
- NHS Addictions Provider Alliance
- The Victorian Responsible Gambling Foundation
- GambleAware Australia/ Gambling Research Australia (GRA)

A.4 Full-text screening tool

The full-text screening tool captured the following in open text boxes:

- Type of document
- Document title
- Author
- Year of Publication
- Country
- Evidence type
- Type of tool (e.g. framework, screening tool, measure)
- Name of framework/ screening tool (if applicable)
- Sector (e.g. gambling, drug use)

The full-text screening tool further scored papers against the following:

- Whether paper discusses gambling harms framework(s)/gambling harm journeys/ longitudinal outcomes (Yes = 1, No = 0)
- Whether paper discusses strengths / limitations of gambling harms framework(s)/gambling harm journeys/ longitudinal outcomes (Yes = 1, No = 0)
- Whether paper discusses gaps in gambling harms framework(s)/gambling harm journeys/ longitudinal outcomes (Yes = 1, No = 0)
- Whether paper discusses gambling harms screening tool(s) (Yes = 1, No = 0)
- Whether paper discusses strengths / weaknesses of gambling harms screening tool(s) (Yes = 1, No = 0)
- Whether paper discusses risk and/or experience of harm in various thresholds of gambling harms screening tool(s) (Yes = 1, No = 0)
- Whether paper discusses at what threshold harms are known to be experienced in gambling harms screening tool(s) (Yes = 1, No = 0)

- Whether paper discusses a framework of harm in an adjacent sector (Yes = 1, No = 0)
- Whether paper discusses measurement of harm in an adjacent sector (Yes = 1, No = 0)
- Whether paper offers suggestions about future development of a (gambling) harms framework (Yes = 1, No = 0)
- Whether paper has clear research question(s) (Yes = 1, No = 0)
- Whether the methods of data collection align with the aims of the research (Yes = 1, No = 0)
- Whether the data and evidence is sufficient to support the discussion/conclusions (Yes = 1, No = 0)
- Whether the research paper is explicit about sources of funding (Yes and it's potentially conflicting = 0, Yes and non-conflicting = 2, No = 0)

A.5 Data extraction tool

The data extraction tool captured the following in open text boxes:

- Overview of paper (aims of paper, brief details of what is included)
- Whether paper authors have developed new tool/framework/metrics
- Number of citations (of paper, using Google Scholar's 'Cited by' feature)
- Description of framework(s)/ model(s)
- Number of dimensions covered in framework(s)/ model(s)
- Methodological underpinnings of framework(s)/ model(s)
- Whether framework(s)/ model(s) have been validated/assessed?
- Strengths and limitations of frameworks/ models/ harm journeys discussed
- Gaps in gambling harms frameworks/models/ journeys discussed
- Description of screening tool(s)/measure(s)
- What the tool is measuring
- Who the tool was designed for (e.g. general population, patients)
- How the tool is administered
- Categories/thresholds used and response categories
- Recall period (e.g. a month, a year)
- Development process of screening tool(s)/ measure(s)
- Whether tool based on a conceptualisation or model
- Whether literature reviews were used to general conceptualisation/items
- Whether tool was based on work with people with lived experience and if so, whether this was a representative sample
- Whether any assessment of validity, reliability or measurement error has taken place
- Number of dimensions/questions covered in screening tool(s) or measure(s)
- Settings that the screening tool has been used in (e.g. names of surveys, or types of treatment service/healthcare setting)
- Strengths/ limitations of screening tool(s)/ metric(s) discussed
- Gaps in screening/tools metrics discussed
- How harm relates to the various thresholds of gambling harms screening tools (including any information about the point harms are known to be experienced)
- Description of framework(s)/ model(s) in adjacent sector

- Number of dimensions covered in framework(s)/ model(s) in adjacent sector
- Methodological underpinnings of framework(s)/ model(s) in adjacent sector
- Whether framework(s)/ model(s) in adjacent sector has been validated/ assessed?
- Strengths and limitations of framework(s)/ model(s)/ harm journey(s) in adjacent sector
- Description of screening tool(s)/ measure(s) in adjacent sector
- Where screening tool(s)/ measure(s) have been used in adjacent sector
- Areas for development of a comprehensive gambling harms framework
- Whether new longitudinal treatment outcomes measures are needed for gambling harms
- If applicable, link to survey questions/screening tools/ detailed description or diagrams of frameworks
- Any additional information relevant to research questions

Appendix B: Key Instruments and Items

B.1 Problem Gambling Severity Index (PGSI)

Thinking about the last 12 months…
[Responses are: Never; Sometimes/Rarely; Most of the time; Always]

1. Have you bet more than you could really afford to lose?
2. Have you needed to gamble with larger amounts of money to get the same feeling of excitement?
3. When you gambled, did you go back another day to try to win back the money you lost?
4. Have you borrowed money or sold anything to get money to gamble?
5. Have you felt that you might have a problem with gambling?
6. Has gambling caused you any health problems, including stress or anxiety?
7. Have people criticized your betting or told you that you had a gambling problem, regardless of whether or not you thought it was true?
8. Has your gambling caused any financial problems for you or your household?
9. Have you felt guilty about the way you gamble or what happens when you gamble?

B.2 South Oaks Gambling Screen (SOGS)

Only scored items are shown below (hence numbers do not start from 1)
see: https://pubmed.ncbi.nlm.nih.gov/3631315/
http://walkerd.people.cofc.edu/360/AcademicArticles/LesieurBlume1987.pdf
The questions have different response codes, please see full scale above.

4. When you gamble, how often do you go back another day to win back money you have lost?
5. Have you every claimed to be winning money gambling, but weren't really? In fact, you lost?
6. Do you feel you have ever had a problem with betting or money gambling?
7. Did you ever gamble more than you intended to?
8. Have people criticized your betting or told you that you had a problem, regardless of whether or not you thought it was true?
9. Have you ever felt guilty about the way you gamble, or what happens when you gamble?
10. Have you ever felt like you would like to stop betting money on gambling, but didn't think you could?
11. Have you ever hidden betting slips, lottery tickets, gambling money, IOUs, or other signs of betting or gambling from your spouse, children or other important people in your life?
13. (If you answered "Yes" to question 12) Have money arguments ever centered on your gambling?
14. Have you ever borrowed from someone and not paid them back as a result of your gambling?
15. Have you ever lost time from work (or school) due to betting money or gambling?
16. If you borrowed money to gamble or to pay gambling debts, who or where did you borrow from (check "Yes" or "No" for each):

B.3 Victoria Gambling Screen (VGS)

Please answer using the scale:
(Read out) **"Never, rarely, sometimes, often, always"**. **"Your answers will be for the last 12 months."**

"So in the last 12 months…"

Interviewer note:

DO NOT PROMPT FOR CAN'T SAY OR NOT APPLICABLE.
For all scale questions, if respondent answers no code as never = 0.

		Never	Rarely	Some-times	Often	Always	Can't say	N/A
Q1	**Has gambling been a good hobby for you?**	0	1	2	3	4	8	9
Q2	**Nowadays, when you gamble, is it fun?**	0	1	2	3	4	8	9
Q3	**Have you gambled with skill?**	0	1	2	3	4	8	9
Q4	**Nowadays, when you gamble, do you feel as if you are on a slippery slope and can't get back up again?**	0	1	2	3	4	8	9
Q5	**Has your need to gamble been too strong to control?**	0	1	2	3	4	8	9
Q6	**Has gambling been more important than anything else you might do?**	0	1	2	3	4	8	9
Q7	**Have you felt that after losing you must return as soon as possible to win back any losses?**	0	1	2	3	4	8	9
Q8	**Has the thought of gambling been constantly in your mind**	0	1	2	3	4	8	9
Q9	**Have you lied to yourself about your gambling?**	0	1	2	3	4	8	9
Q10	**Have you gambled in order to escape from worry or trouble?**	0	1	2	3	4	8	9
Q11	**Have you felt bad or guilty about your gambling?**	0	1	2	3	4	8	9
Q12	**Have you thought you shouldn't gamble or should gamble less?**	0	1	2	3	4	8	9
Q13	**How often has anyone close to you complained about your gambling?**	0	1	2	3	4	8	9

Q14	**How often have you lied to others to conceal the extent of your involvement in gambling?**	0	1	2	3	4	8	9
Q15	**How often have you hidden betting slips, Lotto tickets, gambling money or other signs of gambling from your spouse, partner, children or other important people in your life?**	0	1	2	3	4	8	9

Again thinking of the past 12 months……
(Read out questions)
Record response as Yes or No**.**
For YES response ask second question
Q(b). Otherwise continue to next Q (a).
These questions are only applicable if respondent has a partner.
If no partner or significant other code N/A = 9 and continue with Q19

			Yes	**No**	**N/A**
Q16a	**Have you and your partner put off doing things together?**		**1**	**2**	**9**
Q16b	***If yes, was this made worse by your gambling?***	*Yes 1*	*Partly 2*	*No 3*	*N/A 9*
			Yes	**No**	**N/A**
Q17a	**Have you and your partner criticised one another?**		**1**	**2**	**9**
Q17b	***If yes, was this made worse by your gambling?***	*Yes 1*	*Partly 2*	*No 3*	*N/A 9*
			Yes	**No**	**N/A**
Q18a	**Has your partner had difficulties trusting you?**		**1**	**2**	**9**
Q18b	***If yes, was this made worse by your gambling?***	*Yes 1*	*Partly 2*	*No 3*	*N/A 9*

Please use the scale as before to answer the next questions. "Never, rarely, sometimes, often, always".
In the past 12 months……..

		Never	**Rarely**	**Some-times**	**Often**	**Always**	**Can't Say**	**N/A**
Q19	**How often have you spent more money on gambling than you can afford?**	0	1	2	3	4	8	9

Q20	**How often has your gambling made it harder to make money last from one payday to the next?**	0	1	2	3	4	8	9
Q21	**How often have you had to borrow money to gamble with?**	0	1	2	3	4	8	9

B.4 Short Gambling Harms Screen (SGHS)

SGHS-10 and 20

Items are binary yes/no responses.

Below, the first two columns below show the item numbers for the SGHS-10 and SGHS-20, where the items are reordered in the different instruments.

During the last 12 months, did any of these issues occur as a result of your gambling?

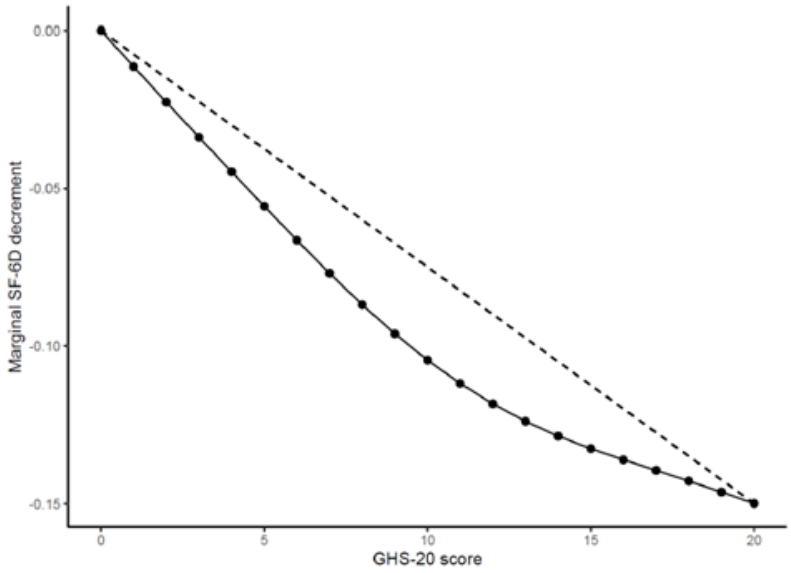
SGHS-20	SGHS-10	Items
1	1	Reduction of my available spending money
2	2	Less spending on recreational expenses such as eating out, going to movies or other entertainment
3	3	Reduction of my savings
4	4	Sold personal items
5	5	Increased credit card debt
5		Less spending on essential expenses such as medications, healthcare and food
7		Used my work or study time to gamble
8		Reduced performance at work or study (i.e. due to tiredness or distraction)
9		Was absent from work or study
10		Increased experience of depression
11	6	Had regrets that made me feel sorry about my gambling
12	7	Felt like a failure
13	8	Felt ashamed of my gambling
14	9	Felt distressed about my gambling
15		Felt insecure or vulnerable
16		Felt worthless
17	10	Spent less time with people I care about
18		Social isolation (felt excluded or shut-off from others)
19		Experienced greater conflict in my relationships (arguing, fighting, ultimatums)
20		Promised to pay back money without genuinely intending to do so

Scoring instructions

- A ‘no’ response to an item should be coded as 0 and a ‘yes’ response coded as 1.

- Sum scores for all of the items.
    - Higher scores indicate higher levels of gambling-harm and the associated SF-6D decrement for each score is presented in the table below

GHS-20 score	SF-6D decrement: SGHS-10	SF-6D decrement: SGHS-20
0	0	0
1	-0.035	-0.011
2	-0.066	-0.023
3	-0.089	-0.034
4	-0.107	-0.045
5	-0.119	-0.056
6	-0.126	-0.066
7	-0.132	-0.077
8	-0.139	-0.087
9	-0.146	-0.096
10	-0.155	-0.104
11		-0.112
12		-0.118
13		-0.124
14		-0.129
15		-0.132
16		-0.136
17		-0.139
18		-0.143
19		-0.146
20		-0.155



The SGHS-20 score plotted against decrements to health-related quality of life, as measured by the SF-6D. The dashed reference line (a straight line) shows how the decrements differ from a simple linear relationship. Data from Browne *et al*., 2023.

B.5 SGHS-AO-10 and 20

Items are binary yes/no responses.

The first two columns below show the item numbers for the SGHS-AO-10 and SGHS-AO-20, where the items are reordered in the different instruments.

During the last 12 months, did any of these issues occur as a result of your gambling?

SGHS-AO-10	SGHS-AO-20	
1		Reduction of my savings
2	1	Late payments on bills (e.g. utilities, rates)
3		Less spending on essential expenses such as medications, healthcare and food
4		Used my work or study time to attend to issues caused by their gambling
5	2	Reduced performance at work or study (i.e. due to tiredness or distraction)
6	3	Loss of sleep due to stress or worry about their gambling or gambling-related problems
7	4	Stress related health problems (e.g. high blood pressure, headaches)
8	5	Increased experience of depression
9	6	Feelings of hopelessness about their gambling
10		Thoughts of running away or escape
11	7	Felt angry about not controlling their gambling
12		Felt distressed about their gambling
13	8	Got less enjoyment from time spent with people I care about
14		Felt belittled in my relationships
15		Experienced greater tension in my relationships (suspicion, lying, resentment, etc.)
16		Experienced greater conflict in my relationships (arguing, fighting, ultimatums)
17	9	Threat of separation or ending a relationship/s
18		Had experiences with violence (including family/domestic violence)
19		Didn't fully attend to the needs of children
20	10	Took money or items from friends or family without asking first

B.6 NatCen-GH13

These harms items are now included in the upcoming Gambling Survey for Great Britain, delivered by the Gambling Commission, where they are interlaced with other items, and not yet treated as a specific 'measurement instrument'. Three of the items are taken from the PGSI, and a number of them are also asked for significant others (see final column).

Item in GC Survey	Items	Responses	PGSI Item	Item in Survey for Sig. Others
	In the past 12 months, how often…			
Q39	...have you borrowed money or sold anything to get money to gamble?	Almost always; most of the time; sometimes; never	PGSI Item 4	
Q41	..have you felt that gambling has caused you any health problems, including stress or anxiety?	Almost always; most of the time; sometimes; never	PGSI Item 6	
Q44	..have you felt guilty about the way you gamble or what happens when you gamble?	Almost always; most of the time; sometimes; never	PGSI Item 9	
	Thinking about your own gambling, how often in the last 12 months has your own gambling led you to…			
Q46	…reduce or cut back your spending on everyday items such as food, bills and clothing?	Very Often; Fairly Often; Occasionally; Never		Q77
Q47	…use savings or borrow money e.g. from family/friends; credit cards; overdraft/loans; money lenders?	Very Often; Fairly Often; Occasionally; Never		N/A
Q48	…experience conflict or arguments with friends, family and/or work colleagues?	Very Often; Fairly Often; Occasionally; Never		Q78
Q49	…feel isolated from other people, left out or feel completely alone?	Very Often; Fairly Often; Occasionally; Never		Q79
Q50	…lie to family, or others, to hide the extent of your gambling?	Very Often; Fairly Often; Occasionally; Never	DSM-IV item	Q81
Q51	…be absent or perform poorly at work or study?	Very Often; Fairly Often; Occasionally; Never		Q80
	In the past 12 months…			

Q52	…have you lost something of significant financial value such as your home, business, car or been declared bankrupt because of your own gambling?	Yes; No		Q82
Q53	…has your relationship with someone close to you, such as spouse, partner, family member or friend broken down because of your own gambling?	Yes; No		Q83
Q54	…have you experienced violence or abuse because of your own gambling?	Yes; No		Q84
Q55	…have you committed a crime in order to finance gambling or to pay gambling debts?	Yes; No	DSM-IV Item	Q85

Appendix C: Mapping instruments against frameworks and Item Response Theory (IRT) severity parameters

On the following pages, the two columns for “Item Response Theory (IRT) Parameters” displays both the ‘severity’ (or ‘difficulty’, in IRT parlance) and the discrimination (“Dscrm”) of the item (i.e. lower discrimination is more specific). Here, the severity scale is logarithmic in nature, where a severity of 2 is an order of magnitude higher than a severity of 1; a severity of 3 is two orders of magnitude higher than 1, etc. With the “instruments”, each of the items are mapped specifically where possible (especially with SHGS/GHS instruments, which are derived from the 72 harms checklist). Otherwise, items are mapped to the most relevant item (and the numbers coloured red, due to some ambiguity). When it is a very non-specific item (i.e. “health problems”), it is mapped to "generic / unmapped" for that domain. Affected Others instruments are mapped against Item Response Theory parameters for people who gamble themselves, although Li *et al.* 2017 establishes the relative comparability of Item Response Theory parameters between people who gamble and affected others. For the column headings, **Red** = "Classic" Instrument; **Orange** = Harms Instrument; **Yellow** = Affected Others Harm Instrument; **"AO"** = Affected Others.

			IRT Paramaters		Instruments									
					"Classic" Clinically		Harms Instruments							
Item abbreviation	**Domain**		**Severity**	**Dscrm**	**PGSI**	**SOGS**	**SGHS-10**	**SGHS-20**	**SGHS-AO-10**	**SGHS-AO-20**	**UGHS**	**HQ / GES**	**NatCenGH-13**	**NatCenGH-13-AO**
Regretb	Emotional/ psychologica	Had regrets that made me feel sorry about my gambling	0.01	1.17			6	11						
Shamea	Emotional/ psychologica	Felt ashamed of my gambling	0.04	1.79			8	13						
Angera	Emotional/ psychologica	Felt angry about not controlling my gambling	0.09	1.7					7	11				
Distressa	Emotional/ psychologica	Felt distressed about my gambling	0.27	1.9			9	14		12				
Hopeless.a	Emotional/ psychologica	Feelings of hopelessness about gambling	0.43	1.73					6	9				
Failure	Emotional/ psychologica	Felt like a failure	0.47	1.87			7	12						
Ext. Distress	Emotional/ psychologica	Feelings of extreme distress	0.64	1.59										
Vulnerable	Emotional/ psychologica	Felt insecure or vulnerable	0.77	1.99				15			5			
Worthless.	Emotional/ psychologica	Felt w orthless	0.86	2.89				16			6			
Escape	Emotional/ psychologica	Thoughts of running aw ay or escape	1.1	1.52						10				
Generic Psych	Emotional/ psychologica	Non-specific emotional/psychological harm												
Generic Psych	Emotional/ psychologica	Unmapped emotional/psychological harm			9	9							Q44/PGSI-9	
Red. Spend.	Financial	Reduction of my available spending money	-0.69	1.32			1	1						
Red. Sav.	Financial	Reduction of my savings	-0.41	0.87			3	3		1				
Red. Rec. Exp.	Financial	Less spending on recreational expenses such as eating out, going to movies or other entertainment.	0.02	1.72			2	2						
Late Bills	Financial	Late payments on bills (e.g. utilities, rates)	0.71	1.98					1	2	1			
Red. Ben. Exp.	Financial	Less spending on beneficial expenses such as insurances, education, car and home maintenance	0.85	2.81										
Red. Ess. Exp.	Financial	Less spending on essential expenses such as medications, healthcare and food	0.85	3.28				6		3	2		Q46	Q77
Inc. CC. Debt	Financial	Increased credit card debt	1.04	0.83		16	5	5					Q47	
Sold Items	Financial	Sold personal items	1.28	1.42	4		4	4					Q39/PGSI-4	
Welfare	Financial	Needed assistance from w elfare organisations (food banks or emergency bill payments)	2.27	1.01										
Loss Assets	Financial	Loss of significant assets (e.g. car, home, business, superannuation)	3.06	0.79									Q52	Q83
Add. Employ.	Financial	Took on additional employment	3.2	0.88										
Emerg. Acc.	Financial	Needed emergency or temporary accommodation	3.26	1.23										
Loss Utilities	Financial	Loss of supply of utilities (electricity, gas, etc.)	3.53	0.66										
Bankrup.	Financial	Bankruptcy	4.1	0.8										
Generic Financial	Financial	Non-specific financial harm			8, 1									
Generic Financial	Financial	Unmapped financial harm												

			IRT Paramaters		Instruments									
					"Classic" Clinically		Harms Instruments							
Item abbreviation	Domain		Severity	Dscrm	PGSI	SOGS	SGHS-10	SGHS-20	SGHS-AO-10	SGHS-AO-20	UGHS	HQ / GES	NatCenGH-13	NatCenGH-13-AO
Red. Sleep Worrya	Health	Loss of sleep due to stress or worry about gambling or gambling-related problems	0.54	1.56					3	6				
Depression	Health	Increased experience of depression	0.75	1.77				10	5	8				
Red. Sleep Gamb.a	Health	Loss of sleep due to spending time gambling	0.79	1.43							7			
Stress Problems	Health	Stress related health problems (e.g. high blood pressure, headaches)	0.89	1.87					4	7				
Physical Activitya	Health	Reduced physical activity due to my gambling	0.9	1.44										
Tobacco	Health	Increased my use of tobacco	1.18	0.92										
Malnutrition	Health	Didn't eat as much or often as I should	1.3	1.29							8			
Alcohol	Health	Increased my consumption of alcohol	1.32	0.85										
Hygiene	Health	Neglected my hygiene and self-care	1.6	1.79										
Medical Needs	Health	Neglected my medical needs (including taking prescribed medications)	1.69	1.98										
Servicea	Health	Increased use of health services due to health issues caused or exacerbated by my gambling	2.11	2.28										
Living Cond.	Health	Unhygienic living conditions (living rough, neglected or unclean housing, etc.)	2.37	1.06										
Self-Harm	Health	Committed acts of self-harm	2.48	1.97										
Suicide	Health	Attempted suicide	2.84	1.25										
Overeating	Health	Ate too much	2.88	0.76										
Emerg. Treat.a	Health	Required emergency medical treatment for health issues caused or exacerbated by gambling	3.63	0.72										
Generic Health	Health	Non-specific health harm			6								Q41/PGSI-6	
Generic Health	Health	Unmapped health harm												
Took Money	Other	Took money or items from friends or family without asking first	1.57	2.04					10	20				
Pay Money	Other	Promised to pay back money without genuinely intending to do so	1.59	1.82				20						
Crimea	Other	Felt compelled or forced to commit a crime or steal to fund gambling or pay debts	1.72	2.06									Q55	Q85
Red. Contrib.	Other	Reduced my contribution to religious or cultural practices	1.86	2.01										
Outcasta	Other	Outcast from religious or cultural community due to involvement with gambling	1.91	2.19										
Children Neglected	Other	Didn't fully attend to needs of children	2.03	1.46						19	10			
Red. Connec.	Other	Felt less connected to my religious or cultural community	2.03	1.71										
Theft Government	Other	Petty theft or dishonesty in respect to government, businesses or other people (not family/friends)	2.06	1.52										
Violence	Other	Had experiences with violence (include family/domestic violence)	2.2	1.62						18			Q54	Q84
Shame Culturea	Other	Felt that I had shamed my family name within my religious or cultural community	2.31	1.77										
Arrested Driving	Other	Arrested for unsafe driving	2.35	1.86										
Children Unsup.	Other	Left children unsupervised	2.36	1.99										
Generic Other	Other	Non-specific other harm												
Generic Other	Other	Unmapped other harm												

			IRT Paramaters		Instruments									
					"Classic" Clinically		Harms Instruments							
Item abbreviation	**Domain**		**Severity**	**Dscrm**	**PGSI**	**SOGS**	**SGHS-10**	**SGHS-20**	**SGHS-AO-10**	**SGHS-AO-20**	**UGHS**	**HQ / GES**	**NatCenGH-13**	**NatCenGH-13-AO**
Reduced Time	Relationship	Spent less time with people I care about	0.33	1.62			10	17						
Neglected Resp.	Relationship	Neglected my relationship responsibilities	0.57	2.19										
Increased Tension	Relationship	Experienced greater tension in my relationships (suspicion, lying, resentment, etc.)	0.67	2.15						15	4		Q50	Q81
Reduced Events	Relationship	Spent less time attending social events (non-gambling-related)	0.8	1.27										
Increased Conflict	Relationship	Experienced greater conflict in my relationships (arguing, fighting, ultimatums)	0.85	2.39		13		19		16			Q48	Q78
Red. Enjoyment	Relationship	Got less enjoyment from time spent with people I care about	0.99	1.55					8	13				
Isolation	Relationship	Social isolation (felt excluded or shut-off from others)	1.08	1.31				18			3		Q49	Q79
Threat Ending	Relationship	Threat of separation or ending a relationship/s	1.42	1.52					9	17				
Belittled	Relationship	Felt belittled in my relationships	1.69	1.8						14				
Actual Ending	Relationship	Actual separation or ending a relationship/s	2.49	0.84									Q53	Q82
Generic Relationship	Relationship	Non-specific relationship harm												
Generic Relationship	Relationship	Unmapped relationship harm			7	8, 11, 14								
Red. Perf.	Work/Study	Reduced performance at work or study (i.e. due to tiredness or distraction)	1.09	1.56				8	2	5				
Late	Work/Study	Was late for work or study	1.21	2.07										
Absent	Work/Study	Was absent from work or study	1.27	2.39		15		9			9		Q51	Q80
Timea	Work/Study	Used my work or study time to gamble	1.36	1.88				7		4				
Lack Prog.	Work/Study	Lack of progression in my job or study	1.63	1.92										
Resourcesa	Work/Study	Used my work or study resources to gamble	1.76	2.25										
Hin. Job. Seek	Work/Study	Hindered my job-seeking efforts	2.04	1.38										
Conflict	Work/Study	Conflict with my colleagues	2.09	1.99										
Lost Job	Work/Study	Lost my job	2.17	1.54										
Exc. Study	Work/Study	Excluded from study	2.27	1.32										
Generic Work/Study	Work/Study	Non-specific work/study harm												
Generic Work/Study	Work/Study	Unmapped work/study harm												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