Policies and interventions to reduce harmful gambling: an international Delphi consensus and implementation rating study

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There is increasing public health concern about harmful gambling, but no consensus on effective policies and interventions to reduce risk and prevent harm has been reached. Focusing on policies and interventions (ie, measures), the aim of this study was to determine if expert consensus could be reached on measures perceived to be effective that could be implemented successfully. Our work involved a pre-registered, three-round, independent Delphi panel consensus study and an implementation rating exercise. A starting set of 103 universal and targeted measures, which were sourced from several key resources and inputs from public health stakeholders, were grouped into seven domains: price and taxation; availability; accessibility; marketing, advertising, promotion, and sponsorship; environment and technology; information and education; and treatment and support. Across three rounds, an independent panel of 35 experts individually completed online questionnaires to rank each measure for known or potential effectiveness. A consensus was reached if at least 70% of the panel judged a measure to be either not effective, moderately effective, or highly effective. Then, each measure that reached a consensus for effectiveness was evaluated on four implementation dimensions: practicability, affordability, side-effects, and equity. A summative threshold criterion was used to select a final optimal set of measures for England. The panel reached consensus on 83 (81%) of 103 measures. Two measures were judged as ineffective by the panel. The remaining 81 effective measures were drawn from all domains (14 of 15 measures in the the marketing, advertising, promotion, and sponsorship domain were judged as effective, whereas five of ten measures in the information and education domain were judged as effective). During the evaluation exercise, the 81 measures were assessed for likelihood of implementation success. This assessment considered the practicality, affordability, ability to generate unanticipated side-effects, and ability to decrease differences between advantaged and disadvantaged groups in society of each measure. We identified 40 universal and targeted measures to tackle harmful gambling (three measures from the price and taxation domain; ten from the availability domain; five from the accessibility domain; six from the marketing, advertising, promotion, and sponsorship domain; eight from the environment and technology domain; three from the information and education domain; and five from the treatment and support domain). Implementation of these measures in England could substantially strengthen regulatory controls while providing new resources. The findings of our work offer a blueprint for a public health approach to preventing harms related to gambling.

Introduction

Gambling products are developed, marketed, and operated by a highly differentiated and profitable global industry.[1] Until relatively recently, successive governments and industry stakeholders have portrayed gambling as an infrequent and inconsequential leisure activity, while acknowledging that a small population of so-called compulsive gamblers experience severe negative effects as a result of their gambling.[2] In the last 5 years, it has been widely recognised that health, social, and economic harms are experienced by a relatively large population of gamblers, their families, those in their social network, and those in their community.[3]

Calls for a public health approach to tackle harmful gambling were first made in the late 1990s,[4] and are now increasing.[5,6] A whole-population, continuum-of-harm perspective, which involves universal and targeted prevention and treatment initiatives and the modification of the social, commercial, and environmental determinants of health inequalities, is currently being called for. To date, there has been limited research and policy evaluation on gambling to inform this approach. Gambling industry stakeholders have used their power

and influence to reject calls for reform, and to cast doubt on the rationale and effectiveness of a public health approach.[7] These stakeholders have deployed the same arguments that have been used by other unhealthy commodity actors by contending that: the gambling industry is a responsible entity; gambling harm arises through individual choice; personal responsibility is key; and voluntary or self-regulatory policy is the most appropriate means of protecting the population.[8]

For other public health concerns (including alcohol use; tobacco use; and the consumption of food and drinks that are high in fat, salt, or sugar) there is well developed evidence on policies and interventions (referred to as measures). Various measures including price and taxation regulations, restrictions on marketing, and provision of treatment have been associated with reduced demand and improved health in the context of these public health concerns.[9–11] Although there are differences between gambling and these other public health issues—both in terms of the specificity of gambling harms and the characteristics of gambling products that are harmful—there are also important similarities between them, including social acceptability,

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the presence of a powerful industry, and the role of socio-environmental effects on behaviour.[12,13] It is reasonable to assume that some of the measures used for other public health concerns could be adapted alongside gambling-specific measures. For example, this approach has been used in the UK to reduce the negative effects of a type of electronic gaming machine (EGM) known as fixed odds betting terminals, by introducing price restrictions.[14]

Policy in England to address harmful gambling has been characterised by an approach that is focused on individual-level and personal responsibility.[15] However, in the past 5 years, several reviews have galvanised a public health agenda. In 2016, the Department of Digital, Culture, Media and Sport reviewed EGMs and social responsibility measures.[16] The Gambling Related Harm All Party Parliamentary Group was also established in 2016. In 2020, a House of Lords Select Committee published a comprehensive review[17] and the Gambling Commission published a 3-year strategy.[18] The UK Parliament Gambling Act 2005 is now under review with an objective to find ways of better protecting vulnerable people.

The Department for Health and Social Care asked Public Health England (PHE) to review the evidence on gambling-related harms to inform prevention and treatment, which was published in 2021.[19] Concurrently, the National Institute for Health and Care Research commissioned a mapping review of measures to reduce the public health burden of gambling-related harms, but this study identified little evidence.[20]

There is a scarcity of literature on a whole-population, public health approach to tackle harmful gambling. An umbrella review by McMahon and colleagues[21] on prevention and education interventions identified low-quality evidence from individual-level interventions targeting gamblers with severe problems. Little is known about measures that have long-term effectiveness or measures that are likely to be successfully implemented. Reflecting on evidence from other areas of public health, Livingstone and colleagues[22] suggested policies and interventions that might be effective to prevent gambling-related harm.

Given this dearth of evidence, we conceived an online Delphi study to determine consensus on measures to prevent and reduce harmful gambling. This method is widely used in the health sciences and is regarded as the most rigorous method for determining group consensus.[23–25]

In the gambling field, Delphi studies have been reported on: screening tests;[26] counsellor competencies;[27] and how friends, family, or members of the public can recognise and support someone with gambling problems,[28] but there has been no consensus study on effective measures for a public health approach. Accordingly, we aimed to determine evidence for consensus among an independent group of experts on effective measures that have potential for successful implementation in England.

Methods

We conducted a pre-registered, two-phase online Delphi consensus and implementation rating study. In the first phase, a panel of experts independent from PHE anonymously completed a questionnaire over three rounds to rank measures for their effectiveness. Between each round, there was an interval of 8–12 days. In the second phase, MS, ZC, CH, and JM rated each effective measure on a set of dimensions to evaluate likelihood of successful implementation in England. The panel survey and implementation evaluation phases of the study were done between March 11 and July 13, 2021.

The protocol was approved by PHE's Research Ethics Governance Group[29] and published on the Open Science Framework.

Panel recruitment

There is no consensus on the number of experts for an online Delphi panel, but it has been recommended that having around 30 members works well.[30] We sought a panel with a mix of personal and professional expertise. We included people with lived experience of harmful gambling and people involved in: academic research; service delivery and commissioning; national and local regulations; and public health policy. Panel members were recruited from countries in the Organisation for Economic Co-operation and Development (OECD).

We identified potential panel members by accessing our professional networks and by contacting organisations supporting people harmed by gambling (eg, the Lived Experience Forum on Gambling Harms, which was established by the Health and Social Care Alliance Scotland[31]). All members of the panel were provided with a participant information sheet which included specific contact details for people within the team who could help with practical questions.

Not being directly affiliated with the gambling industry was a prerequisite for panel membership. Employees of the industry and its affiliated organisations, and those with other direct financial connections, were ineligible. We anticipated that some experts might have indirect or historical financial relationships with the industry due to the mechanism by which the majority of research, education, and treatment has been funded in the UK.[15] To secure a panel with a mix of expertise, we allowed participation from experts with current indirect funding from the Gambling Commission, GambleAware, an industry-related levy, or international equivalent, and those who had received direct funding from the industry over 10 years ago, when it was not feasible to secure participation with more stringent criteria. Eligible experts were required to complete a declaration of interest statement.

Domains and measures

Between November, 2020 and February, 2021, we compiled an initial set of measures through a review of

the following material: official guidance and consultation documents on gambling excise duty;[32] gambling price elasticities;[33] licensing and regulation;[34,35] broadcast and other advertising codes;[36–38] marketing and advertising law;[39] general health promotion;[40] and two influential reports (the review of measures for the Victorian Responsible Gambling Foundation[39] and the House of Lords' review[17]).

We asked 77 experts from our professional networks to recommend measures from their public health fields that might be applied to gambling. Ten experts replied, with expertise in alcohol; tobacco; drugs; diet and obesity; and communicable and non-communicable diseases. We also asked the online Delphi panel to review a draft set of measures and recommend measures that they believed we had overlooked. The panel was also able to make suggestions for additional measures in round one. We adjusted the written description of measures for clarity and readability.

A total of 103 universal and targeted measures were identified. Rather than displaying the measures randomly, we judged that a pragmatic grouping of measures into seven domains would assist the flow of the questionnaire. The measures were grouped by general outcome, but not necessarily by mechanism of action. The seven domains we grouped the measures into were: price and taxation; availability; accessibility; marketing, advertising, promotion, and sponsorship; environment and technology; information and education; and treatment and support. The wording used to describe each measure is in the appendix (pp 2–5).

Price and taxation

We grouped 11 measures into the price and taxation domain. These measures (including increasing operators' duties; taxing wagers; and banning use of credit for gambling) seek to make gambling products less affordable and profitable for gambling operators. Nine measures were included in this domain in round one. Two additional measures were added in round two.

Availability

We grouped 19 measures into the availability domain. These measures (including capping customer deposits; spending restrictions in gambling premises and on gambling products; and tackling unregulated operators) seek to reduce exposure to products and related services. 17 measures were included in round one. Two additional measures were added in round two.

Accessibility

We grouped 14 measures into the accessibility domain. These measures (including restricting access to gambling products; instituting a minimum and verified legal age for gambling; and affordability checks) seek to reduce exposure among vulnerable people and those experiencing harm. 12 measures were included in

round one. Two additional measures were added in round two.

Marketing, advertising, promotion, and sponsorship

We grouped 15 measures into the marketing, advertising, promotion, and sponsorship domain. These measures (including prohibiting or restricting advertising and marketing on television, radio, social media, and streaming and banning sports sponsorships) seek to reduce general exposure to gambling products and related services. 14 measures were included in round one. One additional measure was added in round two.

Environment and technology

We grouped 21 measures into the environment and technology domain. These measures (including banning automated teller machines in gambling premises; banning bonus play features on EGMs and online games; assessing new gambling products for risk of harm; and mandating that EGMs display cash rather than credit amounts) seek to reduce exposure to product technologies that are designed to manipulate gambling behaviour. 19 measures were included in round one. Two measures were added in round two.

Information and education

We grouped ten measures into the information and education domain. These measures (including displaying health messaging on gambling products and websites and public health information campaigns) seek to increase knowledge and understanding of the risks and harmful effects of gambling. Nine measures were included in round one. One measure was added in round two.

Treatment and support

We grouped 13 measures into the treatment and support domain. These measures (including structured psychosocial and pharmacological interventions; identification and brief advice interventions; and facilitation of mutual aid for recovery) seek to help individuals at risk of or experiencing harmful effects associated with gambling. 12 measures were included in round one. One measure was added in round two.

Analysis
Questionnaire

An online software (DelphiManager version 5; COMET Initiative; Liverpool) was used to build a secure, web-accessed, questionnaire.[41] Piloting indicated that this could be completed in 30 min. We instructed the panel to reflect on their knowledge of gambling and rank each measure for effectiveness in reducing gambling-related harms by selecting one number on the following nine-point scale: 1–3 being not effective or has no potential to be effective (ie, not recommended); 4–6 being moderately effective or has potential to be moderately effective (ie, recommended); and 7–9 being

highly effective or has potential to be highly effective (ie, highly recommended).

For each measure, an unable to rate response was available if the member considered that they did not have sufficient knowledge to answer. We asked the panel to not consider feasibility and cost issues, because these issues would be evaluated in the second phase of the study.

Using the online software's default settings, the seven domains were randomly presented in each round. The questionnaire could be completed over several sessions, and there was an option to amend ratings before uploading it. The software automatically constructed each questionnaire to display the panel's aggregated ranking for each measure alongside each member's response.

Following research guidelines,[23] we set the criterion for consensus at 70% (ie, at least 70% of the panel needed to judge a measure as not effective [rank 1–3], moderately effective [rank 4–6], or highly effective [rank 7–9] for consensus to be achieved). If more than 50% of the panel were unable to rate, the measure was removed. All measures were included in at least two of the three rounds.

At completion of the online Delphi process, each measure that reached consensus for moderate or high effectiveness was taken forward into the second phase.

Rating of implementation success
We adapted the acceptability, practicability, effectiveness, affordability, side-effects, and equity (APEASE) framework[42] for our evaluation of implementation success. We removed the acceptability and effectiveness criteria from our analysis. The public and political acceptability dimension fell outside the scope of this study because these are major and dynamic issues that require a separate investigation. The effectiveness dimension was not included because this had been addressed by the Delphi panel. The adapted framework (ie, the PASE framework) that we used asked questions about practicability (ie, to what extent would the measure be hard or easy to implement?); affordability (ie, to what extent would the measure be unaffordable or affordable when delivered as intended?); side-effects (ie, to what extent would the measure lead to unintended adverse or beneficial health outcomes?); and equity (ie, to what extent would the measure increase or decrease differences between advantaged and disadvantaged groups in society?).

Individually, four members of the research team (ZC, CH, JM, and MS) rated each measure produced from phase one on an 11-point scale (–5 to 5) for each of the four PASE dimensions. Higher scores in the positive direction of the scale indicated greater implementation success. For each measure, a total score was computed as the sum of the ratings across raters (expressed as the percentage of the total maximum score).

The original APEASE framework does not include a mandated scoring system, so we used a simple total score cut-off of more than 50% to determine that the measure would have implementation success (ie, it would be relatively easy to implement; it would be relatively affordable; it would be capable of generating unintended beneficial outcomes; and it would decrease social disparities).

Rankings from the online Delphi process were tabulated by measure and domain. The McNemar statistic (p=0·05) was computed to evaluate evidence for the convergence between round one and round two and between round two and round three, for each pair of ratings. Ratings of implementation success were tabulated.

Results
A total of 86 experts were identified. After screening, 62 experts were invited to be panel members. 12 experts did not reply, eight declined, two did not declare their interests and were excluded, and two withdrew before the first round due to competing commitments. 38 experts were recruited to the panel and were sent the first round of the questionnaire. Among these 38 experts, two did not respond to repeated requests to complete the questionnaire and one stated their wish to contribute but did not respond to the questionnaire. The flowchart of panel members is shown in the appendix (p 14).

The characteristics (ie, gender, country, expertise, and declaration of interests) of the 35 members included on the online Delphi panel that completed one or more rounds of the questionnaire are shown in the appendix (p 2). All completed round one, with one member then withdrawing. Out of the 34 members involved in rounds two and three, 32 (94%) completed the questionnaire in round 2 and 31 (91%) completed the questionnaire in round three.

Table 1 shows the panel's aggregate ranks for each measure by round. The unable to rate option was used on at least one measure in round one by 21 (60%) of 35 panel members, in round two by 13 (38%) of 34 panel members, and in round three by 7 (21%) of 34 panel members. Given the criterion set, no measure was removed due to the unable to rate response.

The panel did not reach consensus on 20 measures. The absence of consensus was most apparent in the information and education domain (consensus was not reached for five of ten measures in this domain). Two measures (both in the availability domain) were judged to be ineffective: maximum limit on customers gambling on an operator's website at once (consensus score 77%) and create a state-owned gambling monopoly (consensus score 72%).

All McNemar test statistics (p=0·05) suggested that there was no convergence from ineffectiveness (rank 1–3) to effectiveness (rank 4–9) and vice versa. However, there was evidence of a general tendency for an increase in the proportion of members ranking measures within the moderately effective and highly

	Round one				Round two				Round three			
	n	Rank 1–3	Rank 4–6	Rank 7–9	n	Rank 1–3	Rank 4–6	Rank 7–9	n	Rank 1–3	Rank 4–6	Rank 7–9
Price and taxation domain												
Ban operators' tax deductions on advertising, marketing, and sponsorship	33	9·1%	15·2%	75·8%*	32	9·4%	3·1%	87·5%*	..	..	..	..
Ban the use of credit as a means of gambling	34	0%	8·8%	91·2%*	32	0%	3·1%	96·9%*	..	..	..	..
Operators' duties to rise each year above the rate of inflation	32	18·8%	21·9%	59·4%	30	16·7%	13·3%	70·0%*	..	..	..	..
Duty on the gross profits made by online operators	32	12·5%	25·0%	62·5%	30	3·3%	10·0%	86·7%*	..	..	..	..
Levy on all UK operators' gross profits for prevention, education, research, and treatment	34	8·8%	14·7%	76·5%*	32	3·1%	9·4%	87·5%*	..	..	..	..
Limit amount customers can wager and win when playing online video games	32	9·4%	25·0%	65·6%	31	3·2%	9·7%	87·1%*	..	..	..	..
Tax on wagers proportionate to the risk of harm	30	30·0%	20·0%	50·0%	29	37·9%	13·8%	48·3%	29	41·4%	6·9%	51·7%
Tax on wagers proportionate to the value of the wager	30	30·0%	40·0%	30·0%	29	20·7%	55·2%	24·1%	29	17·2%	65·5%	17·2%
Tax proportionate to the value of winnings	30	33·3%	33·3%	33·3%	29	44·8%	20·7%	34·5%	29	51·7%	13·8%	34·5%
Gambling research, education, and treatment funded from general tax revenue†	..	..	..	..	30	6·7%	23·3%	70·0%*	30	10·0%	6·7%	83·3%*
All organisations and people receiving sponsorship to contribute to funding of prevention, education, research, and treatment	..	..	..	..	32	12·5%	21·9%	65·6%	31	6·5%	6·5%	87·1%*
Availability domain												
Ban in-play betting on sports events	32	12·5%	28·1%	59·4%	30	13·3%	10·0%	76·7%*	..	..	..	..
Ban spread betting on sports events	28	14·3%	57·1%	28·6%	28	10·7%	75·0%*	14·3%	..	..	..	..
Ban the ability to request or place bets on social media platforms	33	12·1%	36·4%	51·5%	32	12·5%	18·8%	68·8%	31	12·9%	6·5%	80·6%*
Ban the display of scratch cards and lotto at points of sale	34	11·8%	35·3%	52·9%	32	3·1%	34·4%	62·5%	31	3·2%	19·4%	77·4%*
Create a state-owned gambling monopoly	26	53·8%	19·2%	26·9%	29	72·4%*	13·8%	13·8%	..	..	..	..
Loot-boxes and related content in video games to be defined as gambling	32	6·3%	34·4%	59·4%	31	3·2%	22·6%	74·2%*	..	..	..	..
Local authorities to restrict new operating licences by cumulative effect	34	2·9%	29·4%	67·6%	32	3·1%	9·4%	87·5%*	..	..	..	..
Mandate breaks during gambling by session time or amount spent, or both	33	3·0%	48·5%	48·5%	32	0%	40·6%	59·4%	31	0%	25·8%	74·2%*
Cap on customer deposits across multiple operators at any given time	33	3·0%	24·2%	72·7%*	32	3·1%	15·6%	81·3%*	..	..	..	..
Limit on how much a customer can spend in any one session	34	2·9%	41·2%	55·9%	32	3·1%	21·9%	75·0%*	..	..	..	..
Limit on floor space and capacity of land-based gambling premises	34	32·4%	52·9%	14·7%	32	37·5%	59·4%	3·1%	31	35·5%	61·3%	3·2%
Maximum limit (h per day per week) that EGMs operate in land-based premises	34	5·9%	58·8%	35·3%	32	0%	65·6%	34·4%	31	0%	74·2%*	25·8%
Maximum limit on number of all categories of EGMs in land-based venues	34	8·8%	61·8%	29·4%	32	3·1%	87·5%*	9·4%	..	..	..	..
Maximum limit on customers gambling on an operator's website at once	32	56·3%	31·3%	12·5%	32	68·8%	28·1%	3·1%	31	77·4%*	22·6%	0%
Maximum limit (24 h) on which gambling websites can operate	32	12·5%	53·1%	34·4%	32	6·3%	78·1%*	15·6%	..	..	..	..
UK banks and other operators to block payments to unregulated operators	34	8·8%	17·6%	73·5%*	32	3·1%	6·3%	90·6%*	..	..	..	..
UK internet service providers to block access to unregulated websites	34	11·8%	8·8%	79·4%*	32	9·4%	3·1%	87·5%*	..	..	..	..
Ban gambling on newly registered accounts for an initial time period	..	..	..	..	30	16·7%	40·0%	43·3%	31	6·5%	54·8%	38·7%
Maximum limit on a customer's spend on gambling during a defined period	..	..	..	..	31	3·2%	19·4%	77·4%*	31	3·2%	3·2%	93·5%*

(Table 1 continues on next page)

	Round one				Round two				Round three			
	n	Rank 1–3	Rank 4–6	Rank 7–9	n	Rank 1–3	Rank 4–6	Rank 7–9	n	Rank 1–3	Rank 4–6	Rank 7–9
(Continued from previous page)												
Accessibility domain												
Ban employees of operators receiving payments linked to customer behaviour	34	11·8%	26·5%	61·8%	32	9·4%	18·8%	71·9%*	..	..	..	..
Ban all gambling in venues where young or vulnerable people are present	34	11·8%	20·6%	67·6%	31	9·7%	0%	90·3%*	..	..	..	..
Ban high-value membership or operator loyalty programmes	34	14·7%	23·5%	61·8%	32	12·5%	6·3%	81·3%*	..	..	..	..
Establish ombudsman service to settle customer service disputes	33	12·1%	39·4%	48·5%	32	6·3%	37·5%	56·3%	31	0%	35·5%	64·5%
Establish host liability on licence holders who do not prevent harmful gambling or do not intervene when harmful gambling occurs	34	2·9%	32·4%	64·7%	32	6·3%	12·5%	81·3%*	..	..	..	..
Establish a public health licensing objective to reduce gambling harm	32	6·3%	28·1%	65·6%	31	6·5%	9·7%	83·9%*	..	..	..	..
Mandatory age verification on all gambling websites before entry	34	8·8%	17·6%	73·5%*	32	6·3%	3·1%	90·6%*	..	..	..	..
Require affordability and source-of-funds checks by gambling operators on customers who register for an account	34	11·8%	32·4%	55·9%	32	9·4%	21·9%	68·8%	31	6·5%	9·7%	83·9%*
Operators to provide a mandatory pre-commitment system with changes allowed only after a cooling-off period	34	5·9%	41·2%	52·9%	32	3·1%	28·1%	68·8%	31	3·2%	16·1%	80·6%*
Online gambling operators to offer free online gambling blocking software	34	17·6%	44·1%	38·2%	32	12·5%	37·5%	50·0%	31	9·7%	19·4%	71·0%*
Online gambling operators to use a standardised tracking system to identify customers who gamble harmfully	34	6·3%	34·4%	65·6%	32	6·3%	9·4%	84·4%*	..	..	..	..
Individuals must be aged at least 18 years to participate in all forms of gambling	33	6·1%	30·3%	63·6%	32	3·1%	15·6%	81·3%*	..	..	..	..
The Gambling Act (2005) to include an explicit focus on preventing and reducing harm	..	..	..	..	30	6·7%	10·0%	83·3%*	29	3·4%	3·4%	93·1%*
Financial institutions to conduct affordability checks on new gambling accounts	..	..	..	..	31	16·1%	9·7%	74·2%*	31	16·1%	0%	83·9%*
Marketing, advertising, promotions, and sponsorship domain												
Ban strategies that incentivise gambling or create a sense of urgency to bet	34	2·9%	26·5%	70·6%*	32	3·1%	9·4%	87·5%*	..	..	..	..
Ban advertising and marketing on radio, television, social media, and streaming	32	9·4%	9·4%	81·3%*	30	6·7%	3·3%	90·0%*	..	..	..	..
Ban all gambling industry involvement in education and research	34	5·9%	29·4%	64·7%	32	3·1%	6·3%	90·6%*	..	..	..	..
Ban all price and discount promotions on gambling products and services	34	11·8%	26·5%	61·8%	32	6·3%	9·4%	84·4%*	..	..	..	..
Ban bet-to-view commercial arrangements.	34	5·9%	29·4%	64·7%	32	6·3%	12·5%	81·3%*	..	..	..	..
Ban gambling advertising before 2100 h on radio, television, and streaming	34	11·8%	38·2%	50·0%	32	15·6%	18·8%	65·6%	29	13·8%	10·3%	75·9%*
Ban gambling advertising during television programmes aimed at children and during age-rated films	34	8·8%	41·2%	50·0%	32	6·3%	21·9%	71·9%*	..	..	..	..
Ban gambling advertising relating to online video games and streaming	34	2·9%	41·2%	55·9%	32	3·1%	15·6%	81·3%*	..	..	..	..
Ban operators' ability to advertise to self-excluded or vulnerable individuals	34	0%	11·8%	88·2%	32	0%	3·1%	96·9%*	..	..	..	..
Ban influencers and market affiliates from endorsing operators	33	12·1%	27·3%	60·6%	32	6·3%	15·6%	78·1%*	..	..	..	..
Ban sports sponsorship of players or athletes by operators	33	3·0%	21·2%	75·8%	32	3·1%	9·4%	87·5%*	..	..	..	..

(Table 1 continues on next page)

	Round one				Round two				Round three		
	n	Rank 1–3	Rank 4–6	Rank 7–9	n	Rank 1–3	Rank 4–6	Rank 7–9	n	Rank 1–3	Rank 4–6	Rank 7–9
(Continued from previous page)												
Require disclosure of all payments and gifts for product endorsement	34	14·7%	26·5%	58·8%	32	12·5%	18·8%	68·8%	30	6·7%	20·0%	73·3%*
Restrict product advertising with proximity to locations used by vulnerable individuals	33	3·0%	39·4%	57·6%	32	3·1%	9·4%	87·5%*	..	..	..	..
Universal ban on all gambling marketing, advertising, and promotions	34	17·6%	14·7%	67·6%	32	12·5%	6·3%	81·3%*	..	..	..	..
Ban broadcast or streaming of all live gambling competitions	..	..	..	..	26	19·2%	26·9%	53·8%	30	13·3%	23·3%	63·3%
Environment and technology domain												
All products to have pre-commitment options to set time and spending limits	35	17·1%	28·6%	54·3%	32	12·5%	15·6%	71·9%*	31	..	..	..
Ban all simulated gambling and gambling content in video games	34	5·9%	52·9%	41·2%	32	6·3%	40·6%	53·1%	30	3·3%	36·7%	60·0%
Ban automated teller machines in gambling premises	35	8·6%	25·7%	65·7%	32	3·1%	9·4%	87·5%*	..	..	..	..
Ban banknote acceptors in EGMs	33	12·1%	39·4%	48·5%	32	12·5%	31·3%	56·3%	30	10·0%	20·0%	70·0%*
Ban bonus play features on EGMs and online games	33	12·1%	27·3%	60·6%	32	9·4%	9·4%	81·3%*	..	..	..	..
Ban ability to bet simultaneously on multiple gambling operators' websites	34	11·8%	26·5%	61·8%	30	6·7%	6·7%	86·7%*	..	..	..	..
Ban discounted or complimentary alcohol at land-based gambling venues	34	11·8%	38·2%	50·0%	32	9·4%	40·6%	50·0%	30	10·0%	43·3%	46·7%
Ban maximum bet or credit buttons on EGMs	33	9·1%	54·5%	36·4%	29	0%	86·2%*	13·8%	..	..	..	..
Ban sale and consumption of alcohol at land-based gambling venues	34	14·7%	44·1%	41·2%	32	9·4%	53·1%	37·5%	30	6·7%	53·3%	40·0%
Ban all technology design aspects of EGMs that misdirect	34	5·9%	23·5%	70·6%*	32	0%	12·5%	87·5%*	..	..	..	..
Operators to provide data on gambling to an independent data bank	34	2·9%	26·5%	70·6%*	32	0%	9·4%	90·6%*	..	..	..	..
New products to be assessed for risk that they facilitate excessive gambling	34	11·8%	32·4%	55·9%	32	0%	15·6%	84·4%*	..	..	..	..
Mandate banks to provide customer data to an independent data bank	34	8·8%	32·4%	58·8%	32	3·1%	25·0%	71·9%*	..	..	..	..
Ban jackpot prizes after a set time or amount gambled on a specific product	35	28·6%	40·0%	31·4%	32	37·5%	34·4%	28·1%	30	43·3%	26·7%	30·0%
Mandate EGM display of cash amounts rather than credits	35	8·6%	45·7%	45·7%	32	3·1%	46·9%	50·0%	30	0%	26·7%	73·3%*
Mandate the maximum number of lines a customer can play on EGMs	34	11·8%	44·1%	44·1%	31	3·2%	48·4%	48·4%	30	3·3%	40·0%	56·7%
All operators to make customer winnings available immediately	35	11·4%	31·4%	57·1%	32	0%	28·1%	71·9%*	..	..	..	..
Standardised minimum speed of play on EGMs and online gambling products	35	5·7%	40·0%	54·3%	32	3·1%	21·9%	75·0%*	..	..	..	..
Video games with any gambling content to have a minimum age restriction of 18 years	35	11·4%	37·1%	51·4%	32	12·5%	15·6%	71·9%*	..	..	..	..
Operators to enable researchers to access gambling venues and related data	..	..	..	..	32	6·3%	25·0%	68·8%	30	6·7%	10·0%	83·3%*
Online operators to provide a single customer view	..	..	..	..	30	3·3%	30·0%	66·7%	30	0%	20·0%	80·0%*

(Table 1 continues on next page)

effective ranges. For example, the proportion of the panel judging that a measure in the price and taxation domain (ie, operators' duties to rise each year above the rate of inflation) would be highly effective increased from 59% to 70–76% across the three rounds. Consensus on this measure was attained through an upward shift process in the 4–6 to the 7–9 effectiveness range.

Consensus

At the end of round three, there was consensus among the panel that 81 measures were effective (64 [79%] measures were judged as highly effective and 17 [21%] were judged as moderately effective). In the price and taxation domain, consensus for effectiveness was reached on eight (72%) of 11 measures. In the availability domain, consensus was reached on 15 (79%) of 19 measures. In the

	Round one			Round two			Round three		
	n	Rank 1–3	Rank 4–6	Rank 7–9	n	Rank 1–3	Rank 4–6	Rank 7–9	n	Rank 1–3	Rank 4–6	Rank 7–9

	n	Rank 1–3	Rank 4–6	Rank 7–9	n	Rank 1–3	Rank 4–6	Rank 7–9	n	Rank 1–3	Rank 4–6	Rank 7–9
(Continued from previous page)												
Information and education domain												
Ban gambling industry from creating health-related information	35	25·7%	28·6%	45·7%	32	28·1%	15·6%	56·3%	30	23·3%	3·3%	73·3%*
Display of health messaging on all gambling products and websites	35	28·6%	37·1%	34·3%	32	25·0%	37·5%	37·5%	30	10·0%	40·0%	50·0%
Feedback of real-time information to customers on time spent and money lost	35	11·4%	40·0%	48·6%	32	3·1%	28·1%	68·8%	30	3·3%	16·7%	80·0%*
Display of harm reduction messages on EGMs and online gambling sessions	35	22·9%	45·7%	31·4%	32	9·4%	62·5%	28·1%	30	6·7%	70·0%*	23·3%
Gambling industry required to fund an independent public health message for each gambling advertisement on television and social media	35	34·3%	37·1%	28·6%	32	37·5%	37·5%	25·0%	30	40·0%	43·3%	16·7%
Operators to report actions taken to prevent gambling-related harm	34	17·6%	47·1%	35·3%	31	9·7%	61·3%	29·0%	30	10·0%	70·0%*	20·0%
Information (eg, odds of winning) to be displayed on EGMs and gambling websites	34	17·6%	50·0%	32·4%	32	9·4%	62·5%	28·1%	30	6·7%	66·7%	26·7%
All gambling products to have plain packaging	35	25·7%	37·1%	37·1%	32	28·1%	40·6%	31·3%	30	23·3%	46·7%	30·0%
Provide universal and targeted social marketing campaigns and health-education programmes	35	11·4%	57·1%	31·4%	32	6·3%	62·5%	31·3%	30	6·7%	56·7%	36·7%
Operators to disseminate official information on gambling-related harms	..	..	..	..	32	18·8%	56·3%	25·0%	30	13·3%	70·0%*	16·7%
Treatment and support domain												
Operators to require self-excluded customers to show that they have taken steps to address harms before their account is reinstated	32	21·9%	46·9%	31·3%	32	25·0%	62·5%	12·5%	31	19·4%	71·0%*	9·7%
Ban automatic or default opt-in options following self-exclusion	33	0%	27·3%	72·7%*	32	0%	9·4%	90·6%*	..	..	..	..
Establish a single multi-operator customer self-exclusion scheme	33	0%	24·2%	75·8%*	32	0%	9·4%	90·6%*	..	..	..	..
Offer combined pharmacological and psychosocial interventions	28	7·1%	60·7%	32·1%	29	3·4%	75·9%*	20·7%	..	..	..	..
Offer free pharmacological interventions for harms associated with gambling	28	25·0%	50·0%	25·0%	29	17·2%	69·0%	13·8%	30	16·7%	76·7%*	6·7%
Offer free psychosocial interventions for harms associated with gambling*	31	3·2%	35·5%	61·3%	30	3·3%	30·0%	66·7%	31	6·5%	22·6%	71·0%*
Offer information on how to access advice, support, and treatment	32	3·1%	53·1%	43·8%	32	3·1%	46·9%	50·0%	31	3·2%	35·5%	61·3%
Provide identification, brief advice, and onward referral interventions	32	9·4%	46·9%	43·8%	32	3·1%	65·6%	31·3%	31	0%	77·4%*	22·6%
Facilitate access to mutual aid and peer-support resources	32	9·4%	34·4%	56·3%	32	3·1%	28·1%	68·8%	31	3·2%	12·9%	83·9%*
Provide helplines that offer information and support	32	6·3%	46·9%	46·9%	32	3·1%	40·6%	56·3%	31	3·2%	35·5%	61·3%
Require staff in gambling venues to identify customers who have harms associated with gambling	34	20·6%	47·1%	32·4%	32	18·8%	56·3%	25·0%	31	6·5%	77·4%*	16·1%
Provide online and mobile application-based psychosocial interventions	31	3·2%	58·1%	38·7%	30	3·3%	66·7%	30·0%	31	6·5%	74·2%*	19·4%
Provision of free gambling blocking software at point of access	..	..	..	..	32	6·3%	40·6%	53·1%	31	3·2%	35·5%	61·3%

Data are the number of panel members that completed each round of the questionnaire (n) and the percentage of votes that each measure received, by ranking. Ranking of measures followed a nine-point scale: 1–3 being not effective or has no potential to be effective; 4–6 being moderately effective or has potential to be moderately effective; and 7–9 being highly effective or has potential to be highly effective. Empty cells indicate that the policy or intervention was not included in round one or was removed in round three after consensus was attained. Full descriptions of each measure can be found in the appendix (pp 2–5). EGM=electronic gaming machine. *Consensus threshold of ≥70% was reached. †Measure included in round three in error, but consensus was attained in round two.

Table 1: The seven domains of measures to prevent and reduce harmful gambling across three rounds of the online Delphi consensus process

accessibility domain, consensus was reached on 13 (93%) of 14 measures. In the marketing, advertising, promotion, and sponsorship domain, consensus was reached on 14 (93%) of 15 measures. In the environment and technology domain, consensus was reached on 16 (76%) of 21 measures. In the information and education domain,

consensus was reached on five (50%) of ten measures. In the treatment and support domain, consensus was reached on 10 (77%) of 13 measures.

Implementation success

The literature search to inform the implementation success evaluation identified evidence relating to PASE dimensions for just 11 of the 81 measures that were judged to be effective by the panel of experts. Most of the evidence addressed implementation practicality issues (nine measures), and some of the evidence addressed equity (two measures). The raters met twice over 6 h to review search results, review feedback from two panel members, and discuss each measure. The PASE scores are shown in the appendix (pp 18–21).

A total of 40 of the 81 measures received a PASE score above the 50% criterion. In the price and taxation domain, three (27%) of 11 measures received a score above 50% (all of which were judged as highly effective). In the availability domain, ten (53%) of 19 measures received a score above 50% (six of which were judged as highly effective). In the accessibility domain, 5 (36%) of 14 measures received a score above 50% (all of which were judged as highly effective). In the marketing, advertising, promotion, and sponsorship domain, 6 (40%) of 15 measures received a score above 50% (all of which were judged as highly effective). In the environment and technology domain, 8 (38%) of 21 measures received a score above 50% (six of which were judged as highly effective). In the information and education domain, three (30%) of ten measures received a score above 50% (one of which was judged as highly effective). In the treatment and support domain, 5 (38%) of 13 measures received a score above 50% (four of which were judged as highly effective). These 40 measures constitute the final product from the study and are shown in table 2.

Discussion

We found that there was consensus among an independent panel of 35 experts that 81 (79%) of 103 universal and targeted measures would be effective elements of a comprehensive public health approach. Among these, 40 (49%) measures (eg, changes to taxation; bans and restrictions on the availability and accessibility of gambling products and their marketing; changes to the operation of specific products; and new information and resources for public health) were rated by members of the research team as likely to be successfully implemented in England.

The three measures in the price and taxation domain (ie, increasing annual operator duties annually above inflation; banning tax deductions on advertising, marketing, and sponsorship costs; and funding research, education, and treatment from general tax revenue) are entirely new to England. In the UK, Her Majesty's Treasury has published estimates on the price elasticity of gambling. These estimates indicate that, for some modes of gambling, demand reduces in response to an increase in price, while simultaneously generating revenue for the exchequer. This observation is relevant to the measures presented in our study, given that increases in costs to the industry would probably be passed onto the player. Funding research, education, and treatment from general tax revenue would align gambling with other public health issues and remove the conflict of interest presented by the current reliance on voluntary donations.

All ten measures in the availability domain would also be new for England, with the exception that one measure (ie, maximum limit on the number of all categories of EGMs in land-based venues) is partially implemented with restrictions on some categories in different settings.[43] Our recommendation would streamline this restriction with a simple blanket maximum.

The measure to amend the aim of the Gambling Act to include an explicit focus on preventing and reducing harms is especially timely. This measure aligns with calls for a move towards a harm reduction approach to gambling and away from the industry-coined responsible gambling concept.[44] Whereas all of the measures in the accessibility domain, those in the availability domain, and those in the marketing, advertising, promotion, and sponsorship domain would be new for England, there is experience from OECD countries to support policy development. Changes to advertising and marketing restrictions are currently in scope as part of the review of the Gambling Act. Although not currently implemented, the Gambling Commission has shown interest in developing a so-called single customer view for gambling products (ie, where customers can see all their accounts and activities in one place) for harm reduction.

Five of the seven measures in the environment and technology domain have not been used before in England. The requirement for gambling operators and banks to provide anonymous data on customer participation and spending on gambling products to an independent data repository would enable higher-quality, unbiased data-linkage research. This type of research is of particular importance because there is very sparse accurate evidence on how much time people spend gambling and on their losses. Two studies that used banking data showed the value of access to financial data,[45,46] highlighting the financial burden of harmful gambling and advancing the field with better outcome measures to estimate intervention effects.

Rather than displaying only credits, the display of remaining cash on EGMs is available as an option for English customers. However, we recommend that cash amount is always displayed; such approach has been introduced by the responsible gambling programme in NS, Canada.[47] The measure to require all gambling operators to make customers winnings' available to them immediately and prohibit the cancellation of a withdrawal request was implemented in the UK on Oct 31, 2021, by

	PASE score (%)
Price and taxation domain	
Operators' duties to rise each year above the rate of inflation*	55·0%
Gambling research, education, and treatment funded from general tax revenue*	55·0%
Ban operators' tax deductions on advertising, marketing, and sponsorship*	51·3%
Availability domain	
Maximum limit (24 h) on which gambling websites can operate†	70·0%
UK banks and other operators to block payments to unregulated operators*	66·3%
Ban the display of scratch cards and lotto at points of sale*	63·8%
Loot-boxes and related content in video games to be defined as gambling*	62·5%
Ban in-play betting on sports events*	61·3%
Ban spread betting on sports events†	61·3%
UK internet service providers to block access to unregulated websites*	60·0%
Local authorities to restrict new operating licences by cumulative effect*	58·8%
Maximum limit (h per day per week) that EGMs operate in land-based premises†	58·8%
Maximum limit on number of all categories of EGMs in land-based venues†	57·5%
Accessibility domain	
Individuals must be aged at least 18 years to participate in all forms of gambling*	71·3%
Ban all gambling in venues where young or vulnerable people are present*	71·3%
The Gambling Act (2005) to include an explicit focus on preventing and reducing harm*	61·3%
Establish a public health licensing objective to reduce gambling harm*	53·8%
Mandatory age verification on all gambling websites before entry*	53·8%
Marketing, advertising, promotions, and sponsorship domain	
Ban all price and discount promotions on gambling products and services*	68·8%
Ban bet-to-view commercial arrangements*	65·0%
Ban strategies that incentivise gambling or create a sense of urgency to bet*	60·0%
Ban gambling advertising during television programmes aimed aat children and during age-rated films*	57·5%
Universal ban on all gambling marketing, advertising, and promotions*	57·5%
Ban advertising and marketing on radio, television, social media, and streaming*	53·8%
Environment and technology domain	
Standardised minimum speed of play on EGMs and online gambling products*	62·5%
Ban maximum bet or credit buttons on EGMs†	58·8%
Video games with any gambling content to have a minimum age restriction of 18 years*	57·5%
Operators to provide data on gambling to an independent data bank*	56·3%
Mandate banks to provide customer data to an independent data bank*	52·5%
Mandate EGM display of cash amounts rather than credits*	52·5%
Online operators to provide a single customer view*	52·5%
All operators to make customer winnings available immediately*	51·3%
Information and education domain	
Feedback of real-time information to customers on time spent and money lost*	55·0%
Display of harm reduction messages on EGMs and online gambling sessions†	53·8%
Operators to disseminate official information on gambling-related harms†	51·3%
Treatment and support domain	
Establish a single multi-operator customer self-exclusion scheme*	58·8%
Provide online and mobile application-based psychosocial interventions†	55·0%
Facilitate access to mutual aid and peer-support resources*	53·8%
Ban automatic or default opt-in options following self-exclusion*	52·5%
Offer free psychosocial interventions for harms associated with gambling*	51·3%

The research team rated each measure, for each of the four PASE dimensions, on an 11-point scale (–5 to 5) The data are a percentage of the total possible score. All measures had a >50% threshold (ranked within domain) to determine that the measure would have implementation success. EGM=electronic gaming machine. PASE=practicability, affordability, side-effects, and equity. *Online Delphi consensus for highly effective. †Online Delphi consensus for moderately effective.

Table 2: **Measures with a consensus for effectiveness rated for likelihood of implementation success**

the Gambling Commission.[48] However, this measure only applies to online gambling.

For the three measures in the information and education domain (ie, display of harm reduction messaging on EGMs and online gambling sessions; require gambling operators to disseminate official health-related information; and feedback of accurate real-time information to gamblers on time spent gambling and money lost) the panel judged that feedback to gamblers could act as a highly effective brake during a gambling session and that this measure should be put to the test. Health-education campaigns often do not lead to changes in behaviour. Furthermore, industry-led campaigns (eg, the When The Fun Stops, Stop" responsible gambling campaign in the UK) are found to be ineffective,[49] so the delivery and evaluation of risk and harm reduction messaging will require a robust and creative approach by public health researchers.

Three of the five measures in the treatment and support domain are partially implemented in England, but there is a pressing need to increase capacity and strengthen the evidence base for effective treatment interventions. Two measures were related to self-exclusion (ie, gambling account suspension and use of product blocking software for those wanting to abstain). Currently, all gambling providers are required to offer a self-exclusion scheme, but provision is disjointed and there is no single multi-operator scheme available to those who want to abstain from all forms of gambling.

Some gambling stakeholders might dispute the need for, and effectiveness of, the various measures identified in this consensus study. Very few public health interventions are amendable to randomised controlled trials, and we defer to the best available natural experiments and other designs. Therefore, the standard for implementation should be set according to the best available evidence, coupled with the precautionary principle, rather than some impossible-to-attain standard, especially when there are strong reasons to act on a harm that is occurring and could be prevented.

Although individual measures can be effective, they are more likely to be effective as part of a coordinated overarching national prevention strategy. A whole-system approach gives importance to both prevention policies and treatment interventions. As has been seen for alcohol and tobacco, a cross-government and inter-agency approach is required at the national and regional scale to facilitate the implementation of the suite of measures we propose. Currently, in the UK, the Department of Digital, Culture, Media & Sport holds decision-making power for gambling policy and the Department of Health and Social Care leads on treatment policy. Going forwards, the Treasury would need to authorise changes to price and taxation; the Department of Health and Social Care and National Health Service England would need to establish treatment care pathways, informed by clinical guidelines set by the National Institute for Health and Care Excellence; and local authorities would need to be involved in many measures relating to the regulation of gambling operators. External stakeholders, including banks, internet providers, and the gambling industry, would need to implement changes to their products and services. Consideration will need to be given to how polices can be introduced so that industry is unable to circumvent their operation and outcomes.

A few limitations are worth discussing. First, the 70% criterion for panel consensus was arbitrary, although we followed best-practice guidelines. Our greater than 50% criterion for evaluating the likelihood of implementation success was arbitrary. However, in the event, we judge that this criterion had face validity. The 83 effective measures were cut back to 40 (a reduction of 52%), with 21 (53%) measures achieving over 80% consensus ratings for effectiveness.

Second, although we considered affordability when evaluating for implementation, we did not assess cost-effectiveness or return on investment. It is possible that some measures might be effective but turn out to be expensive and yield lower return than cheaper and less effective measures.

Third, some of the measures could have been organised and implemented in various ways, which could result in different effects in practice. For example, it could be argued that the measure to ban the use of credit as a means of gambling fits equally logically in the accessibility domain, but we felt that the resulting effects of using credit and not being able to pay it off in full each month does increase the cost of gambling. We are confident that our descriptions were subject to necessary refinement and were fit for purpose.

Implications for policy and research

We were not able to gather reasons for why consensus was not reached for some interventions. However, our findings do suggest that some principles are not readily translated from other public health fields. For example, pricing and taxation measures did not attain the highest level of consensus.

Although we made the decision not to consider public and political acceptability in this study, it is undoubtedly an important element of implementation. These matters should be considered in any plans to take forward the recommendations of this study, when consideration of acceptability can be done in real time, drawing on the expertise of the relevant decision makers and members of the public.

A far-reaching, well resourced, and coordinated public health approach is needed to protect vulnerable people, reduce exposure to gambling products, and provide help to those who experience harms associated with gambling. All future research and policy making processes should strive to effectively involve experts on the basis of their knowledge and experience of gambling, and the public more generally, to find

Search strategy and selection criteria

To inform our evaluation task, we searched the PsycINFO and Business Source Complete databases for systematic reviews published in English from OECD countries between Jan 1, 2014, and June 17, 2021, for evidence on PASE dimensions for each measure. The complete search criteria are in the appendix (pp 6–11). Comments received from online Delphi panel members were also consulted. We did not include studies published in languages other than English.

appropriate solutions for the issues associated with gambling. The implementation of this set of 40 universal and targeted measures could achieve a powerful effect, but we acknowledge that there needs to be careful design, piloting, implementation, adjustment, and evaluation to achieve the expected results.

Our study offers a roadmap for decision makers and could be of practical value to the public health community in other high-income countries with well developed gambling industries and similar contexts.

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