

RESEARCH REPORT

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# A Rapid Review and Research Gap Analysis: A 2020 update

Commissioned by the NSW  
Responsible Gambling Fund



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**MEDICAL AND  
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## GLOSSARY OF TERMS

<b>Term</b>	<b>Definition</b>
CALD	Culturally and Linguistically Diverse populations. Refers to those born overseas, those who have a parent born overseas, and/or speak languages other than English.
Gambling harm	Direct or indirect, short or long-term negative consequences of gambling that spans psychological, social, financial, relationship and employment domains.
Harm minimisation	A public health approach that is based on the premise that gambling is a recreational activity that will at times be associated with harm. Harm minimisation aims to limit or reduce the extent and severity of this harm.
HILDA	Household, Income and Labour Dynamics in Australia (HILDA) is a household survey collecting a range of information on Australians' economic and personal wellbeing, labour market dynamics and family life.
Low risk gambler	A person with low levels of problems with few or no identified negative consequences from gambling. Using the Problem Gambling Severity Index (PGSI), low-risk gamblers score a 1 or 2 and will have answered 'never' to most of the indicators of behavioural problems in the PGSI.
Moderate-risk gambler	A person who has experienced moderate levels of problems leading to some negative consequences from gambling. Moderate risk gamblers have scores of 3 to 7 on the PGSI.
Non-problem gambler	A person who has responded 'never' on each of the indicators on the PGSI. People scoring as non-problem gamblers may engage in frequent or heavy gambling but do not report adverse consequences.
Problem gambler	Those who have experienced problem gambling with negative consequences and a possible loss of control. Using the PGSI, problem gamblers have scores of 8 or more.
Problem Gambling Severity Index (PGSI)	Measurement tool to ascertain the presence and extent of problem gambling. Contains 9 items which are scored never to almost always over a 12-month period. The range of scores is 0 to 27 and a score of 8 or more indicates problem gambling.
Responsible gambling	A set of social responsibility measures underwritten by the gambling industry and regulators to promote integrity, fairness and education on the harms of gambling.

## LIST OF ABBREVIATIONS

AFMs: Affected Family Members  
BD: Behavioural Dependence  
CALD: Culturally and linguistically diverse  
CRAFT: Community reinforcement and family training  
CBT: Cognitive behavioural therapy  
DSM-5: Diagnostic and Statistical Manual – Version 5  
EGMs: Electronic gambling machines  
F/U: Follow-up evaluation  
GRA: Gambling Research Australia  
HILDA: Household income and labour dynamics in Australia  
LRGs: Low-risk gamblers  
MRGs: Moderate-risk gamblers  
NHMRC: National Health and Medical Research Council  
NPGs: Non-problem gamblers  
PG: Problem gambling  
PGSI: Problem gambling severity index  
PNF: Personalised normative feedback  
PTSD: Post Traumatic Stress Disorder  
RCT: Randomised control trial  
RG: Responsible gambling  
RGF: Responsible Gambling Fund  
TCM: Total consumption model



## 1 Executive Summary

The Responsible Gambling Fund undertakes reviews of the gambling literature to inform its research agenda. The overall purpose of these reviews is to identify the main themes of the current state of research, as well as to identify relevant gaps and opportunities. The findings of the current review will inform the Responsible Gambling Fund's research plan and the prioritisation of research projects for the period 2020-2021. This current research gap analysis builds on the 2018 gap analysis by reviewing recent Australian and, where relevant, international gambling research to identify areas in which evidence and/or knowledge is minimal or lacking.

The specific aim of this review is to synthesise the findings of research relating to harm prevention, minimisation, intervention and support and consider priority areas for future focus. An analysis of research gaps was considered within seven research questions identified by the Responsible Gambling Fund a priori. Key questions were:

1. **Prevention and Harm Minimisation:** What are the gaps in our understanding of what works in prevention and harm minimisation?
2. **Treatment:** What are the gaps in our understanding of the long-term efficacy and effectiveness of treatments?
3. **Emerging technology:** What are the gaps in our understanding of emerging technologies and new trends?
4. **Vulnerable groups:** What are the gaps in our understanding of attitudes and behaviours towards gambling in vulnerable or target groups?
5. **Prevalence:** What are the gaps in our understanding of gambling prevalence?
6. **Harm:** What are the gaps in understanding and measuring harm?
7. **Policy:** What are the gaps in our understanding of support for policy development and regulatory effectiveness?

Although these research questions are presented separately, there is crossover and connections between them. Where this occurs, the data are presented in the dominant research question. For example, the prevalence of gambling for vulnerable groups or the prevalence of emerging new forms of gambling are both presented within prevalence. Regulation to address gambling harm is included in the policy section.

### *Method*

A rapid review methodology was undertaken. This approach is consistent with previous gap analyses conducted, supporting continuity and comparisons, and in line with the available resourcing and timeframe. The search was undertaken to identify published peer reviewed articles and grey literature reports since the previous gap analysis; that is, between 01 October 2018 and 23 April 2020. An iterative approach was undertaken with the funder reviewing and approving methodological aspects, such as keywords, the inclusion of all systematic reviews, focus on Australian literature and the provision of potentially relevant grey literature.

Over 5000 unique records were identified and screened against the inclusion (i.e., focused on one of the seven key research questions, empirical study or review, includes anyone harmed by gambling) and exclusion criteria (i.e., research that is not related to: the reduction, limitation, prevention or treatment of gambling harm or problem gambling). Included articles were then screened against specific inclusion into one of the seven research questions. An evaluation of evidence (i.e., quality of research) was conducted. The quality evaluation provided an overall indicator of the generalisability of the included literature.

The gap analysis was informed by NHMRC levels of evidence guidelines. Each research question was assessed for the consistency of evidence, generalisability and applicability to the research priorities. Gaps across each of the research questions were also informed by these guidelines.

## Key findings

A total of 215 documents met the review criteria; 198 peer-reviewed articles and 17 grey literature reports (see Table 1). Thirty percent of studies were conducted in Australia with the majority of other studies conducted in Europe (28%), Canada (14%) and United States of America (13%). Prevention and harm minimisation contained the greatest amount of relevant literature (29%), followed by treatment (21%), and vulnerable groups (21%). Although policy studies were only 9% of included studies, many policy-related issues were identified within and across the other research questions; these too were incorporated within the gap analysis.

The overall quality of the literature was moderate with 26 systematic reviews (inclusive of meta-analyses, scoping and rapid reviews). The majority of included literature was research conducted using exploratory or cross-sectional (49%) or pre-post cross-sectional comparisons (12%), randomised control trials (RCT's) (14%), or qualitative design (7%). The quality of evidence varied however between the research questions with a greater number of RCT's and pre-post studies in treatment than in prevention, and a high rate of reviews that were not systematic and expert opinion dominating the policy literature. This points to an urgent need to include control groups in studies examining prevention, harm minimisation and treatment.

In addition to the peer reviewed and grey literature, we identified research that was currently funded by the Responsible Gambling Fund in 2019 and 2020. This process identified 13 research studies across five of the seven research questions. This included two studies examining prevention and harm minimisation, four studies investigating treatment and methods to improve engagement, four studies on vulnerable populations and three studies on emerging technology and trends. In addition, support was provided for two Gambling Research Australia studies (one harm minimisation and one emerging technology). A summary of this research is included in each of the research questions as well as in each section of the report.

Table 1. *Quantity and quality of studies across the seven research questions*

Research Questions	Total studies	Number of Reviews	Number of Australian	Overall Quality
Prevention and harm minimisation	63	8	17	Low - high
Treatment effectiveness	45	8	6	Moderate – high
Vulnerable groups	44	5	10	Low
Emerging Technology	25	1	7	Low
Gambling prevalence#	21	2	5	High
Harm measurement	7	-	5	Low
Policy	20	2	17	Low

Note: + Prevention and harm minimisation studies were predominantly either low or high (e.g., few pre-post evaluations). This reflected a mix of RCT's and cross-sectional survey studies. # Only prevalence studies which used population representative samples were included

## Gaps in prevention and harm minimisation research

There was a lack of empirical studies for prevention as well as outcome-based studies for much of the prevention and harm minimisation research. The gap analysis points to areas where research could be extended such as new research beyond cross-sectional survey methodology to include comparison groups. Without this empirical testing, it is not possible to know whether these interventions actually work to reduce gambling harm.

- **Schools:** School-based programs indicated some promise for longer-duration programs with a reduction in the frequency of gambling. Regular inclusion in curriculum seems key. To render content relevant, the focus should be risk and protective factors. There were no published studies with Australian participants.
- **Education:** Focusing on education associated with the house edge appears more helpful education than return to player. Delivering education immediately before appears better than during gambling. There was just one Australian empirical study on the impact of prevention for adults.
- **Host responsibility and staff training:** Perceptions of responsibility for minimising harm was mixed where role conflict was a consistent theme. There were limited reports of current staff training and implementation having an impact on gambling harm. There was staff and management dissatisfaction and confusion as to roles in implementing responsible gambling in NSW, Australia and internationally.
- **Attitudes to responsible gambling:** Gamblers reported that they held positive or neutral attitudes towards responsible gambling tools – except for some problem gamblers. Understanding gamblers’ attitudes is now well established, and the next piece of work is needed on how to translate this information.
- **Limit setting:** There was a wide focus on exploring guidelines, deposit limits, personalised normative feedback (PNF), in-venue support and predictors of adherence to limits. Positive outcomes were reported for online warning systems with PNF. The focus of the reviewed literature is on internet gambling with few studies conducted in land-based gaming venues.
- **Self-management (inclusive of self-help):** Cognitive and behavioural strategies were used by all gamblers and their use increases with increased level of gambling risk. The literature reports the focus on responsible gambling initiatives that are predominantly top-down (i.e., industry rather than consumer initiated) has meant limited research is available on early intervention and supporting self-management.
- **Self-exclusion:** There were mixed findings on self-exclusion which was due to perceived complexity of enrolment, lack of global system and poor detection methods. Global programs which are easily accessible online and cover all forms of legalised gambling were reported internationally, but not in Australia.

A summary of these research gaps and implications is presented in Table 2. Two Responsible Gambling Fund research projects that respond to these gaps is currently underway. CQU are conducting an investigation to support limit setting. Using an RCT design they will examine the effectiveness of a set of safe gambling guidelines for EGM play. The Responsible Gambling Fund have also supported the University of Sydney to develop and evaluate a website for self-directed multiple gaming venue self-exclusion. In addition, the Responsible Gambling Fund are supporting the GRA study on the impact of voluntary opt-out pre-commitment for different customer groups (conducted by CQU).

Table 2. *Summary of prevention and harm minimisation*

Research findings	Research gaps
<ul style="list-style-type: none"> <li>• Overseas schools-based education follow-up evaluation at 5 years showing positive impact.</li> <li>• Host responsibility and staff training is undermined by role confusion between profit and protection.</li> <li>• Attitudes to online responsible gambling tools are positive and multiple studies indicate good results for technical solutions to limit setting</li> <li>• Self-management is a limiting approach frequently used by gamblers.</li> <li>• Self-exclusion is assessed as difficult to join and easy to leave with detection methods inadequate.</li> </ul>	<ul style="list-style-type: none"> <li>• Establish, embed and evaluate modules on gambling risk and protective factors.</li> <li>• Develop and evaluate responsible gambling player guidelines.</li> <li>• Identify methods to increase ongoing engagement with responsible gambling tools.</li> <li>• Expand tools to support gamblers to stick to limits in and outside the venue.</li> <li>• Evaluate the effectiveness of online self-exclusion programs for gambling venues as well interactive wagering.</li> </ul>

## Gaps in treatment and predictors of engagement research

The rapid review revealed randomised controlled trials (RCT's) indicate patterns of symptom reduction at follow-up but few differences between treatment groups. These findings were consistent with meta-analyses indicating short term improvement but mixed findings over the longer term. Almost half of the RCT's were post-treatment only, with no studies reporting long-term evaluation.

- **Help-seeking:** There was no research on the effectiveness of the service systems in Australia which offer a vast array of evidence informed interventions.
- **Cognitive Behavioural Therapy (CBT):** There was a consistent reduction in gambling symptoms in the short term. Pre-post studies also reported reduced symptoms. Although CBT overall is demonstrated to be effective, knowledge on the active ingredients is less well known.
- **e-therapy and iCBT:** e-therapy is attractive to clients and may reduce barriers to treatment. Of the internet delivered CBT studies, none showed differential effectiveness across conditions. There were no substantiated treatment options for co-occurring mental health and other addictions. No studies in the current review conducted longer term follow-up evaluation.
- **Pharmacotherapy:** Naltrexone appears effective for reducing gambling symptoms at least in the short term. There were no Australian studies on pharmacotherapy in the current review. This local gap is a concern given its promising findings for people with Gambling Disorder.
- **Novel or new treatment:** Promising new treatments include third wave CBT, specifically mindfulness. A meta-analysis reported good outcomes for mindfulness at least over the short term. There were no Australian studies in the current review on third wave therapies.
- **Affected others:** Over the past 18 months, published research indicated family member treatments were consistently not better than a control condition. Most treatment approaches are based on alcohol and drug studies.
- **Improving access:** Barriers to treatment are well known and these are especially challenging for rural and remote Australians. Alignment between identified barriers and the service system response is not well known.
- **Attrition:** Treatment drop out is related to more complex problems, as well as impulsivity and mental health. More understanding is needed on how to improve engagement and reduce attrition.

A summary of these research gaps and implications is presented in Table 3. Four Responsible Gambling Fund research projects that respond to these gaps is currently underway. The University of Sydney is conducting an RCT comparing a blended face-to-face with online self-directed modules against face-to-face treatment. Two studies are being conducted examining family members including a systematic review across addictions (Deakin University) and a needs analysis of family members in NSW (Australian National University). Deakin University are examining the feasibility of a chatbot virtual assistant in facilitating screening, brief messages and referral to Gambling Help services.

Table 3: *Summary of treatment and predictors of engagement*

Research findings	Research gaps
<ul style="list-style-type: none"> <li>• Short-term improvement but no long-term follow up evaluation was conducted on any studies.</li> <li>• Two studies treated comorbidities, but they were not more effective than gambling treatment alone.</li> <li>• Naltrexone improved symptoms over the short term. Mindfulness was also effective in short-term.</li> <li>• Family member trials indicated treatment was no better than a control condition.</li> <li>• Impulsivity, mental health issues and complex issues were associated with treatment attrition.</li> <li>• Methods are needed to improve engagement and retention.</li> </ul>	<ul style="list-style-type: none"> <li>• More attention to medium- and long-term evaluation of treatment effectiveness.</li> <li>• A range of modalities and service options should be explored for addressing co-morbidity.</li> <li>• Examine the effectiveness of naltrexone and third wave therapies like mindfulness.</li> <li>• Understand the needs of affected others and identify treatments that warrant further investigation.</li> <li>• Identify the alignment between gambler need (across the continuum) and the service system.</li> <li>• Examine methods to increase treatment engagement such as blended treatments.</li> </ul>

## Gaps in vulnerable group research

More information is needed on predictors of risk and protective factors for young people, CALD, Aboriginal and Torres Strait Islanders, and at-risk professions. This includes understanding factors around resilience and peers, community and family. Effective interventions that are tailored to the needs of these vulnerable groups are urgently needed.

- **Young people:** This group report higher rates of problem gambling than the general population. Longitudinal studies indicate gambling problems may be set by age 20 years. In the current published literature, there was a lack of Australian studies looking at youth gambling.
- **CALD and Aboriginal:** Evidence suggests those from CALD backgrounds participate less frequently in gambling activities but have a higher rate of problems. There is very limited work conducted with CALD groups or Aboriginal people at the time of the current review.
- **At-risk professions:** Some professions that are high stress were consistently associated with less frequent gambling participation but more frequent problems. Little is known of professions that consistently demonstrate risk of gambling problems beyond venue workers.
- **Economic hardship:** Evidence was mixed in terms of the impact of recession. There is some evidence that gambling participation may not substantially change but those who start gambling at this time may be more prone to the development of problems. The likely economic downturn due to the current global pandemic of COVID-19 may bring with it increased financial problems that may see a change in gambling behaviours.
- **Other groups:** Other vulnerable populations include those susceptible to family violence, comorbidity, homelessness and those within the correctional system. Interventions for those impacted by family violence were not present in the literature.

Four Responsible Gambling Fund research projects that respond to these gaps is currently underway. CQU is exploring the changing landscape of gambling in childhood, adolescence and young adulthood. Another study on youth by CQU examines the prevalence and attitudes towards gambling as well as the potential migration from gaming to gambling. This study also examines the impact of advertising and normalisation of gambling for young people. Western Sydney Community Forum is conducting a study which aims to develop a practical framework for offering a culturally responsive approach to addressing problem gambling. The framework is targeted for use by mainstream treatment and support services. Western Sydney University are working on the implementation of screening for gambling in comorbid populations in a hospital setting.

## Gaps in emerging technology research

There was a small amount of literature that mostly focused on the convergence of gaming and gambling as well as new types of internet gambling and the use of player tracking data. Across multiple studies, there were consistent findings that gaming, and gambling were increasingly converging; and that those who spent money on in-game purchases (i.e., loot boxes) also more frequently reported gambling problems.

- **Internet gambling:** Engaging in micro-betting was associated with problem gambling. Simulated gaming may be associated with real money gambling. Given the rise in simulated gambling in children's games, more needs to be known of whether this early gaming exposure predicts later problem gambling.
- **Convergence of gaming and gambling:** There is a consistent positive association between gambling problems and loot box purchases. This association is likely because of similar underlying mechanisms. The research is mostly cross-sectional and there is a need for more longitudinal studies.
- **Other developments:** Player data are increasingly being mined to predict and warn players of limits being breached. This data-driven approach has great potential for both industry practices and harm minimisation. Overseas providers are already sharing data with researchers and it would be helpful for research advancement if this data was also shared in Australia.

A summary of these research gaps and implications is presented in Table 4. Four Responsible Gambling Fund research projects that responds these gaps is currently underway. CQU are re-examining the 2014 interactive gambling study and the impact of changes in the gambling environment over the past 6 years. To further understand the convergence of gaming and gambling in Australia, CQU are conducting a study on whether loot boxes are grooming youth for gambling and another study on changing gambling landscapes. In terms of other developments, one study is underway examining the impact of structural characteristics in smartphone betting (CQU) and another looking at the impact of a new ‘cash-out’ wagering product (University of Sydney) have recently been completed.

Table 4. *Summary of vulnerable groups and emerging technology*

Research findings	Research gaps
<ul style="list-style-type: none"> <li>• Young people, CALD and Aboriginal as well as emergency workers, finance industry and military gamble less but experience a higher rate of PG.</li> <li>• Resilience and risk factors, including peers and family, are not well known for vulnerable groups.</li> <li>• Most people engaged in micro-betting have PG.</li> <li>• Spending money on microtransactions in gaming is associated with PG.</li> </ul>	<ul style="list-style-type: none"> <li>• Longitudinal studies involving CALD and Aboriginal people are needed in order to understand resilience and risk.</li> <li>• Co-design prevention and treatment interventions so that they are tailored to specific groups.</li> <li>• Determine community attitudes to micro-betting.</li> <li>• Determine the degree to which operators of gambling are looking to enhance engagement with gaming features.</li> <li>• Understand the association between purchasing of loot boxes and gambling problems in Australia.</li> </ul>

### Gaps in prevalence of gambling participation and harm

These studies provide important information on gambling patterns, but more information is needed on the risk and protective factors of gambling and problem gambling over a longer period of time. A summary of these research gaps and implications is presented in Table 5.

- **Participation in gambling:** Overall, there was a slight decrease in participation of EGM gambling and slight increase in online gambling including sports betting. In Australia, participation in gambling ranged from 53% to 69% across different types of gambling.
- **Rates of at risk and problem gambling:** Research consistently reported around 10% of Australians experience some gambling related risk. National longitudinal Australian studies that track trajectories between levels of risk and types of gambling are needed.
- **Problem gambling in vulnerable groups:** Vulnerable populations including students, youth and at-risk professions consistently reported lower rates of *participation* and higher rates of *problems*. More information is needed on risk and protective factors that predict gambling engagement and problem gambling.
- **New forms of gambling:** There was an increase in internet gambling across all jurisdictions. However, the association between internet gambling and problem gambling is mixed.

### Gaps in harm measurement research

There was disagreement in the literature on the definition, conceptualisation and measurement of harm, as well as how best to distinguish those who experience gambling-related harm and those with a psychiatric condition (i.e., Gambling Disorder). Resolving this balance is important for the design and measurement of prevention, harm minimisation and treatment research.

- **Conceptual understanding of harm:** The included literature has broadened the definition of harm. There is a need to understand harm across all segments of the community beyond the gambler. This includes family and the wider community (e.g., employers) as well as vulnerable groups (e.g., youth and CALD).

- **Measurement issues:** A separate measure may be needed for harm and gambling dependence. The review suggested the PGSI as a proxy for harm may underestimate the true rate of harm. This is because it was never intended as a clinical measure – rather a measure of gambling severity in the general population. There is a need for a range of valid and reliable screening tools that are fit for purpose (i.e., clinical, prevalence).

### Gaps in policy research

The review found the main identified gaps include consumer advocacy and evaluation of regulation effectiveness in Australia. Research on advertising is stronger and more sufficient than other areas.

- **Advertising:** A meta-analysis and multiple Australian studies consistently report an association between advertising, incentives and problem gambling. This evidence is well-established especially in terms of in-game promotions.
- **Public health approach:** Conceptualisation of gambling harm by level of potency appears promising. Public health approaches need to be defined based on evidence rather than opinion. Recommended approaches should be mapped onto an established public health framework.
- **Regulation issues:** The literature reported low adherence to industry codes of practice in Australia and the need for a consumer protection framework for wagering. Research also identified methods to counter offshore betting. There was a disconnect between the importance of this topic and the quality of evidence.

Table 5. *Summary of prevalence, conceptualisation of harm and policy*

Research findings	Research gaps
<ul style="list-style-type: none"> <li>• Participation in gambling ranges from 53-69% with around 10% of people in Australia experiencing some levels of risk. There has been an increase in internet gambling across all jurisdictions.</li> <li>• Conceptualisation and measurement of harm needs to balance a public health approach to minimise gambling problems with high quality clinical care for a recognised psychiatric condition (i.e. Gambling Disorder).</li> <li>• Research on advertising is stronger and more sufficient than other areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Use prevalence surveys to identify risk and protective factors. This includes transitions between levels of risk.</li> <li>• Further development of gambling harm measurement tools that are suitable for different settings (e.g., prevention, clinical).</li> <li>• Evaluate new and emerging codes of practice and frameworks relevant to Australian settings.</li> </ul>

### Discussion and implications

This rapid review provides a useful resource for the Responsible Gambling Fund in terms of informing the research plan and future research funding priorities. Through a rapid review methodology, it identified literature relevant to seven research questions of research priority. The identified literature was of variable quality but for the most part each research question contained information relevant to the Responsible Gambling Fund priorities.

Since the last review, we have identified that more evidence is now available for prevention and harm minimisation as well as treatment and predictors of treatment engagement. Across each of these research questions, interventions and approaches to prevention and harm minimisation are increasingly being delivered and evaluated online. There was a greater understanding of the current trends in gambling participation and gambling problems as well as extensive evidence of associations between gambling advertising and unwanted gambling behaviours.

The available evidence for school-based education, responsible gambling staff training and technical solutions to support limit setting when gambling, suggests that these are now ready for more translation and empirical evaluation. For instance, the RCT on safe gambling guidelines is an important response to these identified gaps. Research projects are also investigating blended face-to-face and online treatment and family treatment needs and the exploration of a chatbot virtual assistant for the Gambling Help website may significantly improve engagement and referral. Research on vulnerable groups has been lacking and the Responsible Gambling Fund research project investigating youth and gambling, CALD and comorbidities go some way to addressing many of these gaps. Knowledge of the association between the convergence of gaming and gambling continues to be explored in Australian research.

However, we are still lacking evidence for medium- and longer-term impact of prevention, harm minimisation and treatment. In addition, there are research gaps in how to foster engagement with responsible gambling tools and also treatment beyond the initial registration or consult. There is promising evidence that pharmacotherapy may be effective for Gambling Disorder as well as other newer treatments such as mindfulness. Further work on understanding the alignment between barriers to treatment and the type and range of services provided could also be of value. Although there is some work with Aboriginal and CALD currently underway this continues to be a gap in terms of understanding risk and protective factors.

Australia is leading the field in areas of addressing gambling as a public health issue as well as a psychiatric condition (i.e., Gambling Disorder). There is a great deal of research occurring that is currently addressing important gaps and will go some way towards extending the evidence base beyond cross-sectional surveys. The available evidence suggests that in many areas there is significant advancement which can be further enhanced through addressing some of the current gaps in the literature.



## 2 Introduction

The Responsible Gambling Fund regularly undertakes a research gap analysis to inform the Fund's research plan and the prioritisation of research projects. This 2020 research gap analysis builds on the preceding 2018 gap analysis and will specifically inform the Responsible Gambling Fund's research plan for the 2020/2021 period. The priority research themes for the Responsible Gambling Fund throughout 2018–2021 are:

- Long term efficacy and effectiveness of treatments
- What works in prevention and harm minimisation
- Emerging technologies and new trends
- Attitudes and behaviours towards gambling in vulnerable or target groups
- Gambling prevalence and understanding and measuring harm
- Support for policy development and regulatory effectiveness.

To support this work, the Responsible Gambling Fund will also focus on:

- Evaluation of current programs and services to determine effectiveness
- Building capability and capacity for rigorous academic gambling research
- Synthesising and publishing relevant national and international insights, research findings and information to build capacity and contribute to improving responsible gambling practices, service improvements and to influence policy
- Developing research insights and findings to contribute to policy and regulatory considerations
- Using 'big data' including the analysis of gambling, social and health data at a regional and state-wide level.

To inform the priority research themes, seven key research questions have been identified in advance by the Responsible Gambling Fund with key questions to be addressed. Using a rapid review methodology, this gap analysis will summarise the current evidence available within these priority areas, to ensure the research plan is underpinned with the available contemporary knowledge.

1. **Prevention and Harm Minimisation:** What are the gaps in our understanding of what works in prevention and harm minimisation?
2. **Treatment:** What are the gaps in our understanding of the long-term efficacy and effectiveness of treatments?
3. **Emerging technology:** What are the gaps in our understanding of emerging technologies and new trends?
4. **Vulnerable groups:** What are the gaps in our understanding of attitudes and behaviours towards gambling in vulnerable or target groups?
5. **Prevalence:** What are the gaps in our understanding of gambling prevalence?
6. **Harm:** What are the gaps in understanding and measuring harm?
7. **Policy:** What are the gaps in our understanding of support for policy development and regulatory effectiveness?

### 2.1 Findings from the 2018 review

In 2018, a rapid review was conducted for the Responsible Gambling Fund which examined seven priority areas (Lawn, Oster, Riley, Baigent, & Smith, 2018). The review search period was for literature published between 1 January 2015 and 16 October 2018. The review included a search of peer reviewed literature (6 databases) and grey literature (Google search – first 50 results of each search). The search was conducted for all themes concurrently, and then evidence organised into one of the seven research questions. A narrative review of the literature was then undertaken. This process involved an overview of the literature, reporting on the consistency of findings and identification of gaps.

The 2018 review identified 541 studies (455 peer-reviewed plus 86 grey literature). The vast majority of the studies related to attitudes (n=137, 25%), technology (n=119, 22%), with similar proportions investigating treatment effectiveness (n=63, 12%), prevention (n=67, 12%), harm measures (n=60, 11%), and policy (n=45, 8%). The majority of peer reviewed studies were cross-sectional (42%), literature reviews or systematic reviews (11%), qualitative studies (10%), or RCT's (8%). Of the included studies 147 were from Australia (31%).

In addition, the 2018 review identified a range of areas for future research with two broad areas recommended as the major focus. First, the review recommended to shift the focus from problem gamblers to understanding and addressing the attitudes, behaviours, adverse consequences, and needs for low and moderate risk gamblers and vulnerable groups including those with mental health needs and others experiencing gambling-related harm (family, community). Second, the review recommended a better understanding of emerging technologies and trends in online gambling, EGM characteristics, industry inducements, stimulated gambling, sports betting, and gambling advertising.

## **2.2 The current review**

This research gap analysis builds on the 2018 report by reviewing recent Australian and, where relevant, international gambling research to identify within the a priori priority areas in which evidence and knowledge is minimal or lacking. The aim is to synthesise the findings of research relating to harm prevention, minimisation and treatment, and consider priority areas for future focus.

The research gap analysis is intended to highlight relevant research for consideration for the NSW context. The intended outcome is a critique and top-level analysis of the quality, nature and extent of the current body of research for priority areas. The review incorporates academic and grey literature to identify gaps in the existing evidence base and key emerging issues which require further investigation. For ease of readability grey and peer reviewed literature were merged. Grey literature may not have been subject to rigorous peer review and as such we have noted this in the results section.

The current analysis examines literature published since 1 October 2018, or that is currently underway. This 2020 gap analysis considers how new research adds to the body of gambling research identified in the 2018 report and what gaps are remaining. The analysis will also include a consideration of the quality of existing and emerging research and evidence.

### *2.2.1 Report structure*

To answer these questions the report presents a brief background to the research questions and then detailed methodology. To maintain continuity between gap analyses over time, the methodology for this report has for the most part replicated previous established methods. As indicated in Section 3, a selection of limitations identified in the 2018 report have been addressed, rendering slight changes in the search strategy and selection of sources.

The results of the review are presented in Section 4 with individual sections presenting the findings against the seven key research questions. Each section presents a brief overview of the topic. Section 5 presents an overview of the findings in terms of the implications for the Responsible Gambling Fund and gambling in NSW. The gap analysis is aligned with the NHMRC recommendations for presenting a body of evidence. The results include an evaluation of the evidence base, consistency across the evidence, clinical impact, generalisability of the research and the applicability to NSW gambling treatment, prevention, harm minimisation and policy. To aid readability, all tables of included studies will be positioned by research questions in an Appendix with study quality ratings.

### 3 Methods

To undertake the gap analysis, a rapid review was conducted. This approach concurrently supports consistency between the 2018 and 2020 report so as to allow easy comparison between the methods and results of both reports. In addition, a rapid review is especially useful for the Responsible Gambling Fund research questions and timeframe because it allows for a fast and efficient approach to searching, sorting and synthesising the literature, with a systematic, replicable method.

Speed and accessibility of relevant information is particularly useful for policy makers, as it enables knowledge to be translated into policy and practice more effectively (Haby et al., 2016), reducing the period of evidence being available and subsequently translated. Within this field, rapid reviews tend to be produced with the needs of policy decision-makers in mind and are often commissioned by them for immediate use. Rapid review methodology utilises a modified systematic review protocol, where these modifications increase the speed with which relevant stages can be completed.

Some common methodological ‘short-cuts’ that have been established include reducing the scope by specifying a more targeted research question, reducing the types of sources included, including only articles published in English, a reduction of the search timeframe, excluding grey literature, using search tools to make literature easier to find, and using only one reviewer for selection and/or data extraction (Haby et al., 2016; Hartling et al., 2015).

Available literature reports that there is not one consistent definition of a rapid review. Timeframes for completion reportedly vary between less than 1 month and 12 months (Haby et al., 2016). Limitations in scope of rapid reviews are also reported, such as reduced breadth of the research questions, reduction of the timeframe of the evidence, possible geographical restrictions (such as regional versus internationally produced studies), a reduction in the detail of analyses, and possibly a more restricted inclusion criteria (Abrami et al., 2010).

Additional benefits include flexibility with the methodology to ensure that specific question/s that are being posed by stakeholders can be answered within the relevant context. This approach therefore provides a methodology well suited for policy makers to provide an understanding of particularly relevant areas within constrained resource settings.

#### 3.1.1 *Current rapid review*

The rapid review methodology outlined by Khangura, Konnyu, Cushman, Grimshaw, and Moher (2012) was followed because it offered a sound and systematic methodology that is internationally recognised for its rigour, aligns with the knowledge to action intention of this task, and is well suited to the short timeframe available. It also provides opportunities for key stakeholders to provide input during the undertaking of the review.

As indicated in Table 6 the method involved eight steps: (1) needs assessment; (2) question development and refinement; (3) proposal development and approval; (4) systematic literature search; (5) screening and selection of studies; (6) narrative synthesis of included studies; (7) report production; (8) on-going follow-up and dialogue with knowledge users.

Table 6. *Rapid review steps*

Action step	Task	Responsibility	Progress
<b>Step 1</b>	Needs assessment and refinement of key topic areas	Undertaken by Responsible Gambling Fund	✓
<b>Step 2</b>	Question development and refinement of specific questions for the gap analysis	Undertaken by ORG and the University of Auckland	✓
<b>Step 3</b>	Proposal development including search strategy and search terms	Undertaken by the University of Auckland	✓
<b>Step 4</b>	Systematic literature search across 5 databases and grey literature search	Undertaken by the University of Auckland	✓
<b>Step 5</b>	Screening and selection of studies plus allocation into the 7 research streams	Undertaken by the University of Auckland	✓
<b>Step 6</b>	Narrative synthesis of included studies	Undertaken by the University of Auckland	✓
<b>Step 7</b>	Presentation of findings and draft report production	Undertaken by the University of Auckland	✓
<b>Step 8</b>	Review and input into the final report	Responsible Gambling Fund, ORG and the University of Auckland	✓

The agreed definition for each of the seven research questions is outlined below (Table 7). These definitions have been informed by a review of the previous study, Responsible Gambling Fund documents and discussion with key stakeholders.

Table 7. *Definition of research questions being studied*

Question	Definition
<b>Prevention &amp; harm minimisation</b>	Prevention, education, school-based training, staff training and early intervention. Targets those who are not seeking help and are typically at lower level severity. Includes individuals, family and community (e.g., venue workers).
<b>Treatment Outcomes and engagement</b>	Impact of treatment on gamblers or their families. Includes all study types (pre-post, randomised trials), interventions types (CBT, pharmacological), and modalities (face-to-face, online). Factors that influence treatment engagement, retention and treatment outcomes.
<b>Emerging Technology</b>	Technological solutions to treatment, harm minimisation, prevention. This also includes issues enabled by technology (e.g., mobile betting).
<b>Vulnerable groups</b>	Focus on attitudes and behaviours of youth, cultural groups and Australian Aboriginal and indigenous populations.
<b>Gambling prevalence</b>	Large scale representative surveys (>500 participants) of gambling participation and gambling severity. Includes specific populations such as adolescents, veterans.
<b>Harm measurement</b>	Understanding and conceptualisation of gambling harm, including how it is measured.
<b>Policy</b>	Issues for policy in Australia including evaluation of regulatory environments and policy options or initiatives.

### 3.1.2 *The search strategy*

A set of search terms were developed which captured the research questions for inclusion. These were developed in conjunction with the University of Auckland librarian as well as through multiple test searches. Test searches were conducted with 14 articles that were a priori identified as reflecting each

of the topic areas. This process ensured that the key terms were specific, yet broad enough to capture relevant literature.

The search terms included variants of gambling AND treatment OR interventions OR harm minimisation OR prevention OR responsible gambling OR education OR prevalence OR harm minimisation OR harm scale OR policy OR regulation OR public health OR vulnerable groups OR technology. Multiple iterations of the search were conducted so as to ensure we were likely to include all relevant articles. It was however necessary to adjust the search to limit the number of records given the rapid review methodology and timeframe. A detailed list of search terms is shown in Appendix 1.

Academic databases were searched including Medline, PsycINFO, SCOPUS, Web of Science, and ProQuest (Health & Medicine, Social Sciences Collection). The final database search was conducted on 23 April 2020 (see Appendix 1 search results against each database). Where possible, the search dates were set to October 2018 – current. Where databases only allowed the search for whole of year, date limits were established through a hand search as part of the screening process for included studies.

In addition, a grey literature search was conducted with the same keywords as outlined above. This was conducted with Google search engine and a targeted website search. The targeted search included Australian agencies that may fund or provide information on gambling, including all Australian state government websites that oversee the provision of gambling harm prevention strategies (e.g., Responsible Gambling Fund NSW, Victorian Responsible Gambling Foundation; VRGF) as well as known national bodies such as Gambling Research Australia. We also searched Australian information repositories including Australasian Gaming Council and the Australian Gambling Research Centre. In addition, major international repositories were searched including Gambling Research Exchange Ontario and the Alberta Gambling Research Institute.

### *3.1.3 The inclusion and exclusion criteria*

The inclusion and exclusion criteria were informed by the project brief, as well as the 2018 report. As indicated in Table 8, the criteria included articles published or commissioned since October 2018 to 23 April 2020. Articles that had already been published before October 2018 but were allocated a journal issue and date within the timeframe were excluded.

We included all systematic reviews using any systematic review strategy (including scoping reviews, rapid reviews). The inclusion criteria also stipulated studies must include data except where the research was related to a discussion investigating the conceptualisation of harm or development of gambling policy.

The exclusion criteria omitted articles that were not focused on the seven research questions. For instance, studies that examined the psychology of gambling, assessment and screening, theoretical models (except harm as that entire research questions was associated with conceptualisation), or experiences of gambling or gambling problems were not included.

Table 8. *Inclusion and exclusion criteria for rapid review*

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none"> <li>• Research published or commissioned since October 2018 to April 2020.</li> <li>• Peer reviewed publication or report. Reports need to include methodology and results (not discussion or position papers).</li> <li>• English language.</li> <li>• Meta-analyses and systematic reviews including scoping reviews, rapid review.</li> <li>• Empirical study except for policy, regulation or measurement of harm.</li> <li>• Includes anyone impacted by gambling harm (gambler, family, community).</li> <li>• Must be focused on prevention, harm minimisation, treatment, emerging technology, vulnerable groups, and measurement of harm or policy related to the prevention or treatment of harm or gambling problems.</li> <li>• Must be focused on gambling not addictions more broadly.</li> </ul>	<ul style="list-style-type: none"> <li>• Not reporting data.</li> <li>• Not related to the reduction, limitation, prevention or treatment of gambling harms or problem gambling.</li> <li>• Books, conference presentations, PhD theses/dissertations, PowerPoint presentations, posters.</li> <li>• Not commentaries, editorials, single case studies except in relation to policy or measurement of gambling harm.</li> </ul>

### 3.1.4 *Screening process*

The five database searches were merged into one EndNote file for screening. This first step involved the removal of duplicates and establishment of a standardised screening form. We piloted the screening process with 20 abstracts for the entire screening team to calibrate and test the review process. Three reviewers were trained in the protocol and conducted the screening. A fourth reviewer was involved in dual coding of 20% of abstracts. Where there was a difference between reviewers, the lead investigator provided arbitration. Because of the wide range of potential literature within the seven research questions, screening erred on the side of inclusiveness whereby the paper would be checked again when allocated to a topic group. At this stage, each paper was assigned a rating of ‘no’ or ‘maybe’. Papers were confirmed as ‘included’ only after the next stage of screening.

Following the screening process, each included study was allocated to a topic for inclusion. This was based on title and abstract, and full text as needed. As indicated in Table 9, a definition of research questions for inclusion was developed which specified inclusion and exclusion criteria. These inclusion / exclusion criteria were incorporated so as to be able to accurately describe the included articles in each topic. Systematic reviews were included as well as all Australian studies that met the topic inclusion criteria. We excluded international studies where the results were deemed (i) not highly relevant to the Australian context, (ii) not generalizable to the Australian context such as studies on attitudes to gambling in Europe, (iii) specific to regulation in another country.

In terms of gambling and treatment, we included all treatment studies and studies that were related to treatment outcomes such as those associated with retention and engagement. Although the specific question was on long-term effectiveness, these additional studies were included so that we were able to get a better idea of factors influencing this topic.

Policy was restricted to papers that were not covered in the other areas such as prevention or treatment. For example, there were multiple studies on prevention that also were relevant to policy but including these in both categories would have essentially duplicated the findings. As a result, policy in the implications section of this report will draw on findings across all key research questions.

Table 9. *Research questions inclusion/exclusion criteria*

Research question	Specific inclusion to this group	Exclusion
<b>Harm minimisation or responsible gambling</b>	<ul style="list-style-type: none"> <li>Any prevention studies, education, school programs, training programs.</li> <li>Includes early intervention, attitudes, beliefs.</li> <li>Community, group or individual approaches. Can be focused on staff or consumers.</li> <li>Must include data but not necessarily follow-up.</li> <li>Can include attitudes towards programs.</li> </ul>	<ul style="list-style-type: none"> <li>Does not include interventions solely for problem gamblers (these belong in treatment).</li> </ul>
<b>Treatment or intervention efficacy or effectiveness</b>	<ul style="list-style-type: none"> <li>No limit to type of study design (pre-post, cohort, RCT, cross-sectional).</li> <li>Can include any type of intervention, including self-help, pharmacological.</li> <li>Includes gamblers or family.</li> <li>Must include data but not necessarily follow-up.</li> <li>Can include predictors of treatment effectiveness such as drop-out or participant characteristics.</li> <li>Includes attitudes and preferences towards help-seeking/service needs.</li> <li>Includes examination of treatment components.</li> </ul>	<ul style="list-style-type: none"> <li>Does not include prevention (must have problem already).</li> </ul>
<b>Attitudes and behaviours of vulnerable groups</b>	<ul style="list-style-type: none"> <li>Focus on Aboriginal, specific cultural groups (CALD), and youth.</li> <li>Can include risk and protective factors and behaviours for these groups.</li> </ul>	<ul style="list-style-type: none"> <li>Discussion papers without data or very small quantitative data sets (&lt;10)</li> </ul>
<b>Technology and trends</b>	<ul style="list-style-type: none"> <li>Focus on technology solutions to treatment, harm minimisation, prevention, and prevalence.</li> <li>Includes emerging issues associated with technology.</li> <li>Technology includes phone, internet, mobile device or any electronic delivery.</li> </ul>	<ul style="list-style-type: none"> <li>Does not include established technology such as internet gambling unless it is a new or emerging area.</li> </ul>
<b>Prevalence</b>	<ul style="list-style-type: none"> <li>Prevalence surveys in any country and with any types of populations (e.g., military, adolescents, veterans).</li> <li>Must be true prevalence survey using a population representative sampling methodology.</li> <li>Focused on gambling participation and gambling harm or problem gambling.</li> <li>May be adolescent or adult populations.</li> </ul>	<ul style="list-style-type: none"> <li>Data included in the study was collected before 2015.</li> <li>Gambling problems not measured with a valid screening tool.</li> </ul>
<b>Harm measurement and conceptualisation</b>	<ul style="list-style-type: none"> <li>Measurement of gambling harm.</li> <li>Focus of paper must be on measurement.</li> <li>Includes the development or conceptualisation of harm or psychometric evaluation.</li> </ul>	<ul style="list-style-type: none"> <li>Does not include scales that might have harm included but are not intended to solely measure gambling related harm.</li> </ul>

	<ul style="list-style-type: none"> <li>• Includes conceptual discussions where it is specifically on the measurement of harm.</li> </ul>	<ul style="list-style-type: none"> <li>• Does not include the rate of harm or application of harm scales.</li> </ul>
<b>Policy or regulation</b>	<ul style="list-style-type: none"> <li>• Description and/or evaluation of regulatory environments in Australia.</li> <li>• Must include data (quantitative or qualitative) unless it is an Australian conceptual study or proposed framework.</li> <li>• This might include issues such as limit setting, gaming, internet gambling, internet advertising and internet industry regulation.</li> </ul>	<ul style="list-style-type: none"> <li>• Must have a strong policy focus (e.g., not just mention that the study might impact on policy)</li> </ul>

### 3.1.5 Screening into research questions

All articles were allocated into the seven research questions through additional screening against the inclusion and exclusion criteria. This process involved examining the full text paper against the seven criteria and indicating ‘yes’ or ‘no’, or ‘exclude’ when not relevant to any of the seven research questions. This approach allowed for studies to be allocated to multiple research questions where appropriate. For example, prevalence surveys of at-risk youth were included in the research questions associated with vulnerable groups and prevalence. All included and excluded studies at this stage were double coded by a research assistant and the primary investigator.

A standardised full text form was developed for data extraction. This form was tailored to each research questions and at a minimum included author, date, country where data collection was conducted, study aims, type of study, methods including participants and description of intervention or data collection, main findings and conclusions. Research assistants were allocated one research question each, with the primary investigator checking all extractions. This allocation of personnel ensured accuracy, consistency and increased speed of extraction, as well as observation of themes as they emerged across the extraction process.

### 3.1.6 Evaluation of evidence

An important consideration when reviewing the literature is to ascertain the quality of the evidence. However, for the current work, a key challenge with evaluating the evidence is the array of included studies needed in order to concurrently answer the 7 research questions. For instance, NHMRC levels of evidence are well-established yet are specific to assessing the quality of randomised trials (4 out of 6 of the criteria) and the potential bias due to trial methodology. The focus on these quality criteria is an issue for the current study because fewer than 14% of included studies were RCTs and for the remainder, this level of evidence was not applicable. For instance, the weakest NHMRC level of evidence supported results from pre-post studies, which subsequently excludes all cross-sectional and survey-based studies (which were the bulk of the literature in this review).

The 2018 review assessed quality of evidence using a rating scale (Quality of Evidence) that covered literature reviews and a range of empirical studies (Laranjo et al., 2015). This rating scale included reviews on a grade from very high (systematic reviews with meta-analysis) to high (systematic reviews without meta-analysis) and moderate/low for narrative or other non-systematic reviews. Empirical studies are assigned similar ratings of high (RCT’s examining intervention outcomes), moderate (RCT examining non-intervention indicators such as attitudes as well as pre-post, quasi-experimental or cross-sectional comparisons), and low (exploratory studies or qualitative studies).

To ensure we were able to rate all included studies, we added items to the quality of evidence scale (see Table 10). This included longitudinal studies which we graded as moderate, expert consensus and



conceptual frameworks were graded as low, and expert opinion or case report as very low. Although we excluded single person case studies, there were some examples of a case report related to policy.

Each study was rated according to this modified quality rating scale with the grade noted in the tables. A summary of quality for each research question was provided. This summary was based on the average quality across included studies within that research question.

Table 10. *Quality of evidence adapted from Laranjo et al, 2015*

Type of study	Design	Grade
<b>Literature Reviews</b>	Systematic review with meta-analysis	Very High
	Systematic review without meta-analysis	High
	Narrative with systematic search (rapid, scoping)	Moderate
	Narrative non-systematic	Low
<b>Empirical studies</b>	Randomised Controlled Trials	High
	Pre-Post studies, quasi-experimental, cross-sectional comparisons, longitudinal studies*	Moderate
	Exploratory or cross-sectional (without comparison)	Low
	Qualitative	Low
	Expert consensus, conceptual frameworks*	Low
	Expert opinion; case report*	Very low

Note: \* Design was added to the quality of evidence design list

### 3.1.7 Data synthesis

Data were synthesised narratively and informed by standards for conducting a systematic review (Moher, Liberati, Tetzlaff, & Altman, 2009). The primary investigator allocated each source a code that represented sub-themes within each research question. To do this, all included studies were reviewed by the lead investigator, allocated a code and these codes were merged into a higher order set of themes (cf qualitative coding analysis) (Hsieh & Shannon, 2005). A summary of included sources by theme was provided against each of the research questions. Key sources were also discussed in detail where relevant to the research question.

The final section of this report on study implications is drawn from the findings across the rapid review. This analysis was informed by the NHMRC framework for the preparation of guidelines (Hillier et al., 2011). It involved noting the overall direction of findings, generalisability of findings and relevance to the Responsible Gambling Fund.

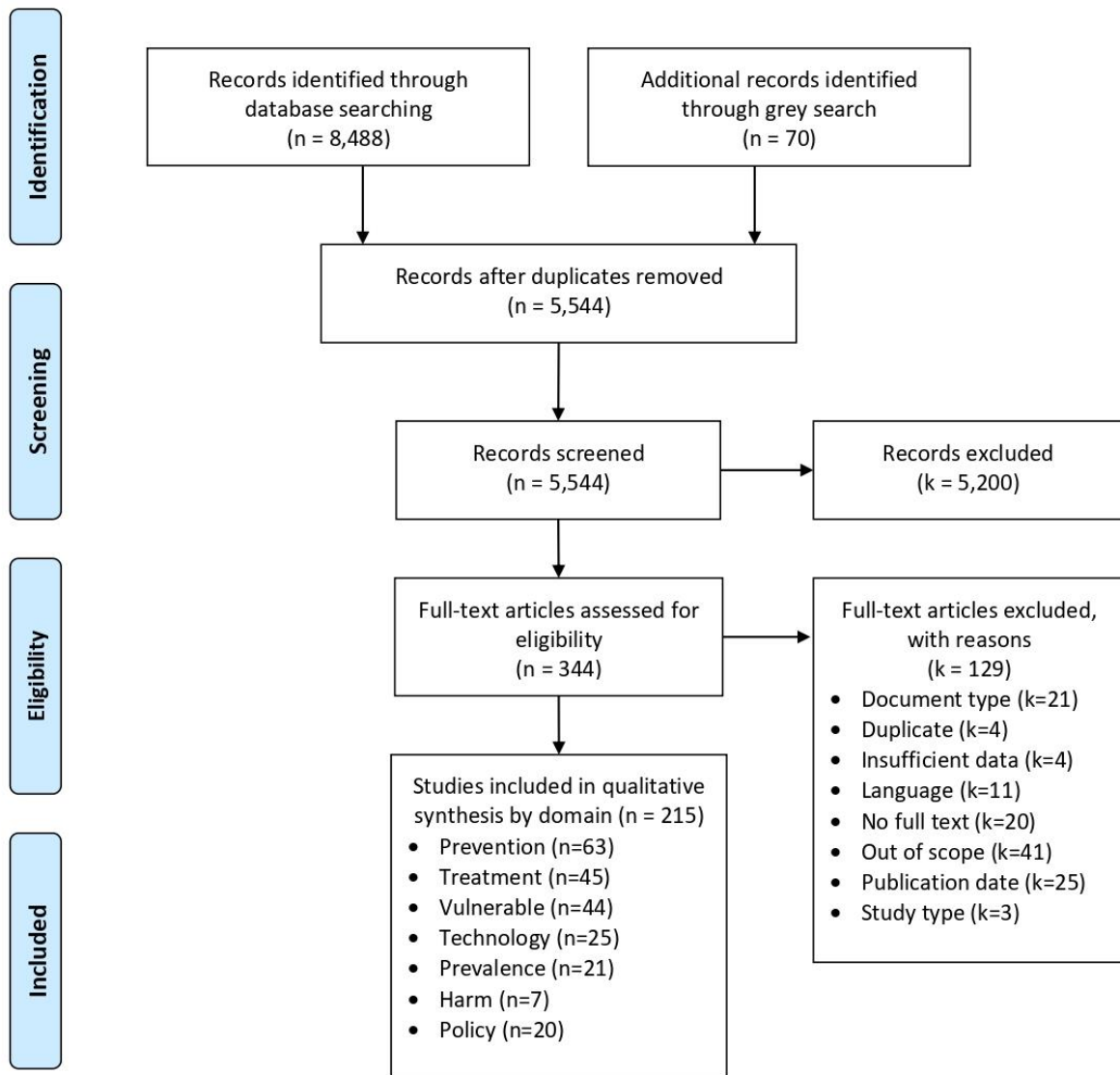


Figure 1. PRISMA indicating flow of information into the rapid review

## 4 Results

The majority of this section presents the narrative results, focusing predominantly on the Australian literature where available, in line with the aims of the rapid review. Details for each study, regardless of country of origin, are included in Appendix 7-13 and overall summary of each priority area are in Tables 18-24. The section commences with the number of studies, country of origin the quality and study design used.

The database search retrieved a total of 8,488 articles plus 70 grey literature sources. This number was reduced to 5,544 after duplicates were removed (See Figure 1). The first stage of the title and abstract review resulted in the exclusion of an additional 5,200. For the remaining 344 articles, full text papers were reviewed for eligibility against the inclusion and exclusion criteria after which 215 were included in the review. This included 198 peer reviewed publications and 17 grey literature reports. The most frequent reason for exclusion at full text review was the date the article was published online (i.e., during 2018 but before October).

As described earlier, each article was assessed for its inclusion in one of the seven research questions. Articles could be allocated to more than one research question. As indicated in Table 11, the most frequently identified data was in relation to prevention, followed by treatment and vulnerable groups.

Table 11. *Summary of included studies by research questions*

Topic Area	Total (%) studies
<b>Prevention / Harm minimisation</b>	63 (29.3%)
<b>Treatment</b>	45 (20.9%)
<b>Vulnerable groups</b>	44 (20.5%)
<b>Technology</b>	25 (11.6%)
<b>Prevalence</b>	21 (9.8%)
<b>Harm</b>	7 (3.3%)
<b>Policy</b>	20 (9.3%)

### 4.1.1 Overview of included studies

Thirty percent of the included literature involved data collection undertaken in Australia, or a review with an Australian first author. The second most frequent source of studies was Europe, followed by Canada and USA (see Table 12).

Table 12. *Country of focus by number of peer reviewed articles and reports*

Country	Prevention/ Harm Min	Treatment	Vulnerable groups	Emerging technology	Prevalence	Harm measure	Policy	Total
<b>Australia</b>	17	6	10	7	5	5	17	67 (29.8%)
<b>Europe</b>	22	15	14	4	7	-	1	63 (28.0%)
<b>Canada</b>	11	10	4	2	1	2	1	31 (13.8%)
<b>USA</b>	6	5	8	6	4	-	1	30 (13.3%)
<b>UK</b>	4	4	7	6	3	-	-	24 (10.7%)
<b>Asia</b>	3	4	-	-	-	-	-	6 (2.7%)
<b>New Zealand</b>	-	1	1	-	1	-	-	3 (1.3%)
<b>South America</b>	-	1	-	-	-	-	-	1 (0.4%)

Table 13 below includes an overview of the included studies. There was a total of 26 systematic reviews which included 12 meta-analyses. There were an additional 8 reviews included that were not systematic but were part of the Australian literature in an area of interest (i.e., policy, vulnerable groups, emerging technology). Overall the quality of reviews was high to very high. However, it should be noted that many of the included reviews had concerns about the quality of their included studies (i.e., few RCT's and many cross-sectional surveys).

The most frequent form of empirical study was exploratory or cross-sectional. These were most often survey designs involving convenience sampling. Just 14% of included studies were randomised controlled trials with an additional 12% pre-post studies or cross-sectional comparisons. Overall the evidence was skewed towards low quality due to the high rate of exploratory studies.

Table 13. *Quality of included studies in the review*

Study type	Study sub-type	Quality Grade	Total N (%)
<b>Literature Reviews</b>	Systematic review with meta-analysis#	Very high	12 (5.8%)
	Systematic review without meta-analysis	High	5 (2.4%)
	Narrative review that is systematic (rapid review, scoping review)	Moderate	9 (4.4%)
	Narrative/other forms of review	Low	8 (3.9%)
<b>Empirical studies</b>	Randomised Controlled Trials	High	29 (14.1%)
	Pre-Post studies, quasi-experimental, cross-sectional comparisons, ecological momentary assessment, longitudinal studies.	Moderate	25 (12.1%)
	Exploratory or cross-sectional (without comparison)	Low	101 (49.0%)
	Qualitative	Low	15 (7.3%)
	Expert consensus, conceptual frameworks	Low	2 (1.0%)

#includes 2 studies from prevalence

The quality of evidence differed across research questions. As indicated in Table 14, the treatment literature contained the most frequent high-quality ratings (40% of the included treatment literature). The areas with the lowest quality ratings were harm measurement, policy, vulnerable groups and emerging technology. The low-quality ratings indicate a serious issue across these studies in terms of the lack of control groups and small samples.

Table 14. *Quality ratings by research questions*

Research questions	Quality Ratings		
	Very high/High	Moderate	Low/ very low
Prevention / Harm min	23 (37%)	5 (8%)	35 (55%)
Treatment	18 (40%)	13 (29%)	14 (31%)
Vulnerable groups	-	6 (14%)	38 (86%)
Emerging Technology	1 (4%)	6 (24%)	18 (72%)
Harm	-	-	7 (100%)
Policy	2 (10%)	3 (15%)	15 (75%)

\*Note prevalence is not included as these were not rated

In addition to the peer reviewed and grey literature, we identified research that was currently funded by the Responsible Gambling Fund in 2019 and 2020. This process identified 13 research studies across five of the seven research questions (see Appendix 6). This included two studies examining

prevention and harm minimisation, four studies investigating treatment and methods to improve engagement, four studies on vulnerable populations and three studies on emerging technology and trends. In addition, support was provided for two Gambling Research Australia studies (one harm minimisation and one emerging technology).

## **4.1 Prevention and harm minimisation**

Prevention and harm minimisation are integral to reducing gambling related harm. Prevention is focused most frequently at school age children and those who may be at risk of developing gambling problems (e.g., venue workers) (Productivity Commission, 2010). Harm minimisation (also referred to as harm reduction) aims to reduce the amount of harm that is associated with gambling behaviours (Gainsbury, Blankers, Wilkinson, Schelleman-Offermans, & Cousijn, 2014). Central to a public health approach, harm minimisation acknowledges that gambling is a widespread activity that in many ways is embedded in both mainstream and sub-cultures. Harm minimisation in gambling targets those with low or minimal problems through regulation or industry-initiated programs such as self-exclusion and controls on access to gambling opportunities (Ladouceur, Shaffer, Blaszczynski, & Shaffer, 2017). In addition to these approaches, bottom-up consumer-initiated strategies are also used as a way of self-regulating consumption and minimising harm.

The current review sought to identify Australian and, where relevant, international research related to prevention and harm minimisation for gambling. Prevention included any empirical studies involving education, schools or training programs delivered to youth, adults or at-risk populations (e.g., venue workers). It also included any empirical harm minimisation study investigating methods to reduce harm including those that were quantitative or qualitative, focused on consumers, staff or the wider community and were government, industry or individual initiated. Any study that specifically sought to address problem gambling was included in treatment.

### *4.1.1 Evidence sources*

There were 63 included studies under the prevention and harm minimisation. These were 8 systematic reviews, 16 RCT's, 4 pre-post or cross-sectional comparisons, 28 exploratory or cross-sectional, 6 qualitative and 1 expert consensus. Seventeen studies originated in Australia with the vast majority from Europe. The focus of prevention / harm minimisation studies included:

- (i) prevention and schools,
- (ii) education,
- (iii) host responsibility and staff training,
- (iv) limit setting,
- (v) use and experiences of responsible gambling tools,
- (vi) self-management, and
- (vii) self-exclusion.

The quality of the included studies varied with 37% rated as very high or high quality, 8% rated as moderate quality and 55% rated as low quality. These quality results are somewhat consistent with an included umbrella review (i.e., a review of reviews, discussed further below) which also found that the overall quality of included studies was low (McMahon, Thomson, Kaner, & Bamba, 2019).

There were two Responsible Gambling Fund supported research projects identified. CQU are conducting an investigation to support limit setting. Using an RCT design they will examine the effectiveness of a set of safe gambling guidelines for EGM play. The Responsible Gambling Fund have also funded University of Sydney to develop and evaluate a website for self-directed multiple gaming venue self-exclusion. In addition, the Responsible Gambling Fund are also supporting the Gambling Research Australia study on the impact of voluntary opt-out pre-commitment for different customer groups (conducted by CQU).

McMahon et al. (2019) conducted an umbrella review of the effects of prevention and harm reduction intervention on gambling behaviours and related harm (see Table 15). They identified 10 systematic reviews reporting 55 unique studies. The target of included studies related to:

- (i) supply reduction (strategies that aim to reduce or disrupt the supply and availability of gambling opportunities),
- (ii) demand reduction (strategies that aim to reduce the desire to gamble and prevent or reduce initiation of problematic gambling), and
- (iii) harm reduction (strategies that aim to reduce potential harmful impacts of gambling).

It was found that most of the evidence base related to pre-commitment and limit setting (24%), self-exclusion (20%), youth prevention programs (20%), and machine messages/feedback (20%). The effectiveness of harm reduction interventions was limited by the extent to which users adhere to voluntary systems. Fewer than half of the studies examining youth prevention programs demonstrated positive effects on behaviour.

None of the identified reviews extracted data or reported on the differential effects of intervention strategies across sociodemographic groups. The quality of the included reviews (and their primary studies) was generally poor, and clear gaps in the evidence base have been highlighted. The authors conclude that the evidence base is dominated by evaluations of individual-level harm reduction interventions, with a paucity of research on supply reduction interventions (McMahon et al., 2019).

Table 15. Summary of McMahon et al., umbrella review

Target	Mechanism	Reviews	Findings
Reduced opening hours of gaming machines	Physical opportunity	1 review identified four studies	One study reported a 3.3% reduction in gambling expenditure for venues that reduced their hours.
Caps on EGM	Physical opportunity	One review identified 2 studies	No change in gambling expenditure or profits.
Youth prevention interventions	Psychological capability/reflective motivation	Four reviews evaluated evidence for 11 unique studies.	Five of the 11 studies demonstrated a reduction in gambling behaviours or gambling problems.
Smoking bans	Social opportunity/reflective motivation	One review identified two studies	Smoking bans had mixed effects. Most people reported no change in spending due to the smoking ban, but a single study found a significant reduction in gambling expenditure following a ban.
Pre-commitment /limit setting	Voluntary and not enforced: reflective motivation  Mandatory and enforced: physical opportunity	Five reviews evaluated evidence for 13 unique studies	Seven studies found no change in gambling behaviour. Six studies reported positive reductions in duration of play and gambling activity. Time and monetary limits were found to be more likely to both be set, and exceeded, by problem gamblers.
Self-exclusion	Physical opportunity	Two reviews evaluated evidence for 11 unique studies	Studies found positive effects on gambling behaviour during the exclusion period. Positive effects on gambling related harm were also identified, e.g., reduced anxiety and

			depression, and reduced family and work difficulties. Problem gambling status increased once excluders returned to gambling.
Machine messages/feedback	Psychological capability/reflective motivation/automatic motivation	Five reviews evaluated evidence for 9 unique studies	Eight of the nine studies reported some positive effects of machine messages/feedback on gambling behaviour. Self-appraisal messages were found to be more effective than informational messages on session length.
Personalised feedback interventions (PFI)	Psychological capability/reflective motivation	One review with 2 studies	Both studies showed greater decreases in gambling behaviour in the PFI groups compared to the cognitive intervention groups.
Removal of large note acceptors	Physical opportunity	Two reviews evaluated evidence for 4 unique studies	Two studies found no self-reported change in behaviour. Two studies found a reduction in gambling frequency, along with money and time spent gambling. Reductions were greater for high risk groups.
Maximum bets	Physical opportunity	One review identified 3 studies	Two studies report no self-reported effects. One study reported reduced time spent gambling and reduced losses.
Removal of ATMs	Physical opportunity	One review identified 2 studies	One study reported no change. One study identified a 7% reduction in EGM expenditure.

Two other reviews conducted in 2020 reported findings consistent with those reported in the umbrella review. Forsstrom, Spangberg, Petterson, Brolund, and Odeberg (2020b) meta-analysis examined educational programs (inclusion: aged 13 years and above, majority not problem gamblers, RCT, 1 month or more follow-up) and responsible gambling strategies (inclusion: aged 16 years or over, majority not problem gamblers, any study with outcome data). This review identified 8 educational studies with meta-analysis only possible for those examining school programs with long-term interventions and for the outcome frequency of gambling. They reported a reduction in frequency of gambling but stated that the certainty of evidence was low. In terms of responsible gambling measures, Forsstrom et al. (2020b) identified 26 studies but meta-analysis were only possible on two responsible gambling measures. Personalised feedback was associated with decreased frequency of gambling at 3 months but again the certainty of the evidence was low.

Grande-Gosende, Lopez-Nunez, Garcia-Fernandez, Derevensky, and Fernandez-Hermida (2020) conducted a systematic review of harm minimisation programs (referred to as prevention in the study) with young adults (18-35 years). This review included nine studies and was focused on programs primarily focused on gambling problems. The study found that all studies targeted college or university students. The most used technique was PNF, which had generally good results in reducing and/or minimizing at-risk or problem gambling.

#### 4.1.2 Prevention and schools

There were four studies that examined prevention with adolescents (Calado, Alexandre, Rosenfeld, Pereira, & Griffiths, 2019; Keen, Anjoul, & Blaszczyński, 2019; Parham et al., 2019; Ren, Moberg, Scuffham, Guan, & Asche, 2019). These studies included one RCT, two pre-post, and one non-systematic review. Calado et al. (2019) RCT examined the impact of an intervention for 111 high

school students versus no intervention. The intervention aimed to correct knowledge and reduce gambling-related misconceptions, but also to target factors associated with adolescent risky behaviours in general (e.g., sensation seeking). The program comprised five didactic units, each consisting of one session, that were delivered in class during normal school time. At the 6-week follow-up evaluation, adolescents reported improved knowledge about gambling, reduced misconceptions and attitudes, and decreased total hours spent gambling per week. A similar study in Maryland by Parham et al. (2019) delivering three x 45-minute sessions also reported improved knowledge of gambling.

Keen et al. (2019) presented an Australian non-systematic review which proposes four key recommendations for developing gambling education programs for youth engagement. They argue that current content in school-based programs focuses on problem gambling and severe harms which does not resonate with young people. The review recommended four key advancements in school-based education including:

- Shift away from messages about gambling harm and severe problems. Given the target audience is likely non-gamblers or non-problem gamblers it may be more relevant to teach how the problem develops including risk and protective factors.
- Explain how misconceptions about the profitability of gambling games (e.g., the gambler's fallacy) play an important role in the development of problems.
- To understand profitability of gambling requires the teaching of mathematical principles and concepts (e.g., randomness and statistics).
- Develop program materials that leverage technology to teach complex concepts.

Ren et al. (2019) conducted a large-scale secondary analysis (n=16,262) to determine the long-term effectiveness of a gambling intervention programs for students aged 8-18 years of age. These programs were delivered at least annually and contained one or more classes on gambling education. They reviewed the records of over 16,000 students and found the prevalence of problem gambling had decreased more over a 5-year period among those students receiving the intervention twice compared to receiving the intervention only once. However, this effect was not identified among students receiving the intervention three or more times. Thereby indicating receiving the intervention twice was optimal.

#### *4.1.3 Education*

Five studies examined education for adult gamblers which focused on return to player, odds of winning and the timing of education when engaging in EGM gambling. An Australian study by Beresford and Blaszczyński (2020) allocated 112 students to one of four different methods of providing return to player information (infographic, vignette, brochure, or control). They found participants exhibited a lack of understanding of the concept of return to player at baseline. However, exposure to any of the experimental conditions did not result in a greater understanding of return to player than controls. Newall, Walasek, and Ludvig (2020) conducted an RCT's in the UK on the impact of education focused on return to player or house-edge on perceived chances of winning. This study reported house-edge was better understood by gamblers than return to player and had a stronger association with perceived chances of winning. Two further RCT's examined education on the odds of gambling (Broussard & Wulfert, 2019; Zenker, Wagener, & Vollmer, 2018). Broussard and Wulfert (2019) reported that education on the odds of winning was associated with reduced gambling over a 2-week period. Zenker et al. (2018) reported that there was no impact from education on odds on lottery purchases at 3-month follow-up evaluation.

One Canadian study examined the importance of the timing of responsible gambling education. Hollingshead, Amar, Santesso, and Wohl (2019a) randomised 98 participants to an animation on responsible gambling either immediately before gambling or once their limit was reached. They found viewing the animated responsible gambling education before play predicted a greater intention to set a limit in future gambling sessions.



#### 4.1.4 *Host responsibility and staff training*

Host responsibility refers to the expectation that gambling operators provide a safe and secure gambling environment. Three studies have examined the concept of host responsibility including the balance between social responsibility and financial interests (Fiedler, Kairouz, & Reynolds, 2020; Riley et al., 2018b) and gamblers perceptions of stakeholder responsibility for minimising harm (Gray, LaPlante, Abarbanel, & Bernhard, 2019). The Australian study by Riley et al. (2018b) conducted 40 interviews with problem gamblers, counsellors, venue staff and consumer advocates in South Australia (SA). This study found role conflict was identified as a considerable source of stress for venue staff who described conflicting priorities in responding to problem gamblers whilst maintaining employer profit margins. Problem gamblers described offers of help from venue staff as hypocritical and disingenuous. Venue staff also described reluctance to make moral judgements through the identification of and engagement with problem gamblers, and gamblers described resentment in being singled out and targeted as a problem gambler. Being approached and offered referral to a counselling service was a rare occurrence among problem gamblers.

Smith, Wolstenholme, and Duffy (2019) examined attitudes towards venue shut-down (time and duration). They recruited 50 participants to focus groups and interviews and a further 312 NSW gamblers to an online survey. This report found that venue shutdowns are likely to negatively impact only on people with gambling problems and two out of three respondents supported shutdowns. The minimal shutdown period was four hours together with uniform shutdown periods (all at the same time so as to avoid swapping venues). However, the report also noted that shutdown periods may be inconvenient to shift workers. However, this group report higher rates of gambling problems than the rest of the population.

Four studies examined issues around staff training including one systematic review, two cross-sectional and one qualitative study (Abarbanel, Gray, LaPlante, & Bernhard, 2019; Beckett, Keen, Angus, Pickering, & Blaszczyński, 2020a; Beckett, Keen, Swanton, & Blaszczyński, 2020b; Hing, Russel, & Rawat, 2020). Beckett et al. (2020a) systematic review identified 22 studies which examined the effectiveness of staff training programs in land-based gambling venues. The review found staff training was associated with greater confidence by staff in being able to talk about gambling with patrons but found serious methodological weaknesses whereby real-world impact on gamblers was unable to be determined. Evidence suggests that training programs may need to be tailored according to employee role. Abarbanel et al. (2019) reported differences in perceptions of gamblers and responsible gambling training between front of house staff and those who have less direct contact with gamblers.

These findings are supported by more recent Australian research that indicates staff training increases ability to identify behavioural indicators of problem gambling (Beckett et al., 2020b). Focus groups with staff and managers in NSW venues reported a lack of certainty and understanding in relation to their specific roles, potential legal consequences and implications for employment by taking the initiative to proactively intervene.

In their comprehensive responsible conduct of gambling study, Hing et al. (2020) undertook a mixed method approach with NSW venue staff. A survey exploring the experiences of responsible gambling staff training was completed by 2289 frontline gaming staff including supervisors and managers of clubs and hotels in NSW. This was supplemented with focus groups involving a sub-sample of participants in order to gain a richer understanding of the survey results. This report found employees regularly observed patrons showing signs of problem gambling, but rarely approached those who did not ask for help. Although there was responsiveness to patrons who asked for help, this was a rare event (around 2 people per year with most respondents reporting no requests). Furthermore, there were major deficiencies in the practice of monitoring self-exclusion (e.g., not being aware of who was excluded, failure to update the register, too many exclusions making it impossible to recognise individuals). Participants reported NSW clubs and hotels were guided by an informed choice approach to responsible gambling (e.g., signage, limits on advertising and banning gambling by minors) which was counter to other Australian and international jurisdictions that were guided by a public health or

harm minimisation approach (e.g., venue modifications that are effective in reducing harm). The authors concluded that current staff training in NSW had limited impact on harm prevention or reduction and substantial change is needed to training and subsequent practice to make a meaningful difference to gambling related harm.

Four studies examined prevention practices outside of gambling venues and with workers not involved in the delivery of gambling. These practices included staff training for those working in the child welfare sector (Beecher & Stansbury, 2019), prisons (Castrén, Lind, Järvinen-Tassopoulos, Alho, & Salonen, 2019a) and screening in health care settings (Guilcher et al., 2020). Rafi, Ivanova, Rozental, Lindfors, and Carlbring (2019) conducted an evaluation of training of 23 Human Resources officers and managers in identifying and responding to problem gambling in Sweden. They reported that the presentation of cases, facts, and general knowledge was appreciated by most participants.

#### 4.1.5 *Limit setting*

Limit setting refers to supporting gamblers to set a limit and to stick with it. Sixteen articles have examined limit setting including one systematic review and meta-analysis, 8 RCT's, one cross-sectional comparison, 5 cross-sectional studies and one qualitative. The limit setting literature focuses on guidelines, deposit limits, PNF, in-venue support and predictors of adherence to limits.

Currie et al. (2019b) proposed a research plan to define Canada's first low-risk gambling limits. Building on the same collaborative evidence-informed approach that produced Canada's Low-Risk Alcohol Drinking and Lower Risk Cannabis Use Guidelines, a research team is leading the development of the first national Low-Risk Gambling Guidelines that will include quantitative thresholds for safe gambling. This paper describes the research methodology and the decision-making process for the project. The guidelines will be derived through secondary analyses of several large population datasets from Canada and other countries, including both cross-sectional and longitudinal data on over 50000 adults. A scientific committee will pool the results and put forward recommendations. In Australia, similar guidelines have been developed by Dowling et al. (2018a) which was reported in the 2018 rapid review.

Three European studies have examined the effects of deposit limits. Ivanova, Magnusson, and Carlbring (2019a) RCT compared four different time points where a limit could be set: (1) at registration, (2) before or (3) after their first deposit, or (4) no intervention. Data on customers from Finland with online slots as a preferred gambling category (n = 4328) were tracked in the platform for 90 days from registration. The study reported no differences in outcomes (losses) as a result of the timing of the reminder. A second study examined the effects of voluntary deposit limit setting on gambling expenditure over the long term (Auer, Hopfgartner, & Griffiths, 2020). Tracking almost 50000 gamblers across seven European countries, the study found among the most gambling-intense players, those who had voluntarily set limits gambled significantly less money over the next year compared with those who had not. Another study by the same research team examined attitudes towards a global limit setting option (Auer, Reiestad, & Griffiths, 2020). The study surveyed 2352 online and land-based gamblers in Finland on their attitudes towards limit setting and whether global limits (meaning limits across multiple different forms of gambling) were helpful. This study reported three-quarters of the sample were aware the new global loss limit had been introduced, two-thirds of the sample knew how to set limits on their gambling, and four-fifths of the sample had a positive attitude towards the global loss limit. Very few gamblers played with other operators after they had reached their spending limits.

Two cross-sectional studies examined predictors of setting limits. Auer and Griffiths (2019) examined the player accounts of over 70000 gamblers in Norway. The results demonstrated that it is possible to predict future limit-setting based on player behaviour. The most important variables predicting future limit-setting using an algorithm were players receiving feedback that they had reached 80% of their personal monthly loss limit, personal monthly loss limit, the amount bet, theoretical loss, and whether the players had increased their limits in the past. The study concluded that with the help of predictive analytics, players with a high likelihood of changing their limits can be proactively approached.

A second qualitative study involving 104 gamblers in Australia examined factors related to vastly exceeding personal limits. Rodda, Bagot, Manning, and Lubman (2019a) reported almost half of gamblers in Victorian gaming venues had experienced a bust in the past 12 months (defined as gambling more than intended in a single session that may or may not occur during a gambling lapse or relapse). The amount of money spent on the bust ranged from \$20 to \$1500 AUD ( $m = \$446$ ,  $SD = \$402$ ). The presence of a bust was positively associated with the amount of money spent on gambling in the past 30 days, and self-reported greater gambling related harms and greater gambling severity. Reasons for busts included both distal (pre-venue) factors (i.e., negative affect, lapse in intentions to set a limit, needing to win money) and proximal (inside venue) factors (i.e., chasing losses, wins or spins, social facilitation and losing money too quickly). Bust-prevention strategies identified by participants were both distal (e.g., avoid gambling altogether, leave cards or cash at home, set a time or money limit) and proximal (e.g., walk away when losing and change the manner of gambling).

Many limit setting interventions rely on personal feedback to the gambler. The purpose of feedback is to prompt cognitive dissonance through increased self-awareness of gambling behaviours. Four studies examined personalised normative feedback (PNF) including one meta-analysis, two RCT's and one cross-sectional study. Peter et al. (2019) meta-analysis of 11 studies reporting 16 interventions for problem gamblers examined the effectiveness of PNF. PNF represents the results from assessment and offers comparisons with other people of similar demographics (e.g., age, ethnicity, location). This meta-analysis indicated a small but significant impact of PNF when tested with a range of gamblers (low risk to problem gambler) and samples (predominantly college students). PNF appeared to be most efficacious when used in populations of greater gambling severity, when individuals were provided with gambling-related educational information, and when used in conjunction with motivational interviewing. Factors associated with reduced efficacy included in-person delivery of feedback without motivational-interviewing and informing participants of their score on a psychological measure of gambling severity. In another study, Auer, Hopfgartner, and Griffiths (2018) demonstrated that PNF may be helpful for gamblers who are nearing their expenditure limit. They sent feedback to over 50000 online gamblers who reached an 80% limit and reported that compared with an historical control more gamblers stuck to their limits. Similarly, it was demonstrated that high spending gamblers spent less over a 12 month period when receiving a PNF letter and motivational interviewing phone call compared with no contact (Jonsson, Hodgins, Munck, & Carlbring, 2019; Jonsson, Hodgins, Munck, & Carlbring, 2020).

In addition to limit setting online, four studies have examined methods to support limit setting in EGM venues. These studies used pop-up messaging in EGM venues (Hollingshead, Wohl, & Santesso, 2019b; Tabri, Hollingshead, & Wohl, 2019), sports betting (Lole et al., 2019), and roulette (McGivern, Hussain, Lipka, & Stuppel, 2019). Using an RCT Tabri et al. (2019) examined the timing of pop-up messaging (70%, 90% or 100% progress towards limit) and reported early warning messages were helpful in sticking to limits. Hollingshead et al. (2019b) conducted a similar study using feedback on the amount of money and credit lost. They reported no impact of this information and also reported that most players did not recall being prompted with this information during play. McGivern et al. (2019) conducted an RCT in a lab-based setting with 45 students in the UK playing roulette. They reported expenditure-specific warning messages about current losses were more effective than generic messages for reducing expenditure. Lole et al. (2019) lab based experimental study with an eye tracking device, indicated that for the most part players either ignored the messages or did not notice their presence.

An Australian study recently examined the effectiveness of a brief intervention in gambling venues that was aimed at helping participants stick to their limits. Rodda, Bagot, Manning, and Lubman (2020) recruited gamblers in Victorian gambling venues and Crown Casino into a brief planning intervention versus assessment only control. They reported that overall the intervention did not make an impact in session or over 30-days for gamblers in the moderate risk and problem gambling category. However, those in the intervention spent significantly less money in session than intended while control group spent the same as intended. Furthermore, following the intervention, all

intervention participants in the moderate risk and problem gambling category intended to spend significantly less in the next 30 days compared to the preceding actual 30 days spend (whereas no change was reported in the control group).

Finally, Drosatos, Arden-Close, Bolat, Vuillier, and Ali (2019) examined how betting data could be used to support gamblers in sticking to their limits. They conducted 22 interviews with gamblers, gambling industry personnel, and addiction specialists to understand perceptions of using player tracking data to aid personal decision making. Drosatos et al. (2019) report identified three types of limits (time, money and access) and although there was general support for using data, there was mixed findings on what data were suitable. For instance, participant views on the use of geolocation, heart rate and emotions were perceived as helpful by some but intrusive by others. There was also concern that the gambling industry might use player tracking information for financial gain or share this information with a third party. The study concluded that in-depth interviews with service users are needed before developing any interventions.

#### *4.1.6 Use and experiences of responsible gambling tools*

Responsible gambling tools provide at-risk gamblers with support to minimise harm from gambling. There have been 10 studies that have specifically focused on the use of responsible gambling tools. Five cross-sectional studies examined attitudes towards responsible gambling tools (Engebo, Torsheim, Mentzoni, Molde, & Pallesen, 2019; Gainsbury, Angus, Procter, & Blaszczynski, 2020; Ivanova, Rafi, Lindner, & Carlbring, 2019b; Procter, Angus, Blaszczynski, & Gainsbury, 2019; Tong, Chen, & Wu, 2019). Overall, these studies reported generally positive or neutral attitudes towards responsible gambling tools. Ivanova et al. (2019b) surveyed over 1200 gamblers from Finland and concluded that tools were acceptable to non-problem gamblers but disruptive to problem gamblers. Two Australian studies have examined attitudes to tools. Gainsbury et al. (2020) examined perceptions, motivators and barriers to use in a sample of 564 online gamblers. They reported most participants were aware of the responsible gambling tools and had accessed activity statements. Those at risk and with problem gambling used deposit limits or time-outs more frequently than those without problems who did not see these as personally relevant. In another study by the same team, Procter et al. (2019) applied the theory of planned behaviour to 193 online gamblers to predict tool uptake. They reported that the use and application of tools on gambling websites is not perceived as effortful, but under volitional control and straightforward. In one of the few studies examining the predictive factors associated with gamblers using gambling-reducing tools they found positively influencing individual attitudes, perceived views of others and past tool use could increase online wagering customers' use of consumer protection tools.

Five international studies examined responsible gambling tool engagement (Forsstrom, Rafi, & Carlbring, 2020a; Gainsbury, Abarbanel, Philander, & Butler, 2018), changes in gambling cognitions (Zhou, Goernert, & Corenblum, 2019), and impact of responsible gambling tools (Parke et al., 2019; Theriault, Norris, & Tindale, 2018). Forsstrom et al. (2020a) study on dropout from usage of tools in Norway examined the records of 835 online gamblers and reported initial high use of the tool but that use was for a short time only. This study reported that the use of tools did not impact gambler behaviour. Gainsbury et al. (2018) conducted focus groups with 39 gamblers (younger/older and frequent/infrequent gamblers) in Canada. They reported that older people preferred messages about limit setting, whilst young adults and frequent gamblers responded to messages about their own play and expertise. Skill game gamblers were interested in the odds of winning and their own outcomes over time. However, all groups agreed that using positive, non-judgmental language in messaging is important. Tailoring messages to cohort may be important especially for older people (Theriault et al., 2018). Finally, Parke et al. (2019) examined the use of a specific tool - within-session breaks in play. This RCT with 74 gamblers imposed a brief break in play which was related to a reduction in post-break gambling. In contrast, Auer, Hopfgartner, and Griffiths (2019) reported no impact of forced break in play when it was imposed after one hour of play.

Two studies looked at responsible gambling tools from a more global perspective in terms of the establishment of a new responsible gambling centre (Gray, Keating, Shaffer, & LaPlante, 2020) and

the impact of the environment on betting behaviour (Ho, Lam, & Lam, 2019). Gray et al. (2020) conducted an evaluation to determine the reach and uptake of a new responsible gambling centre in the Massachusetts casino in North America. The stated goals of the centre were to teach patrons about important gambling concepts associated with more responsible gambling behaviour. Following a 6-month data collection, the study reported engagement with approximately 1% of patrons (70% non-planned interactions). Those gamblers who had engaged with program staff (n=129) reported improved beliefs about gambling but did not report other improvements to gambling behaviours. In a study looking at the impact of casino servicescape, Ho et al. (2019) interviewed 475 casino gamblers on their perceived self-control when inside the casino. They reported a significant indirect effect between how confident the person feels that they can stick to their limits when in the venue and the degree of unplanned gambling. The authors suggest that effective responsible gambling programs should enhance casino customers' perceived internal control which may lead to improved adherence to limits.

#### 4.1.7 *Self-management*

Self-management broadly encompasses behaviour change techniques and strategies aimed at limiting or reducing gambling behaviours. All of the literature in this topic refers to self-management or self-help strategies that can be used to limit or reduce gambling. However, as demonstrated below, the literature in this area is mixed in terms of focusing on both problem gambling and harm minimisation as well as mixing responsible gambling tools with consumer-initiated approaches. We have included all relevant studies on self-management here, even though some may not fit the definition of harm minimisation because of the way they are conceptualised (e.g., self-help for problem reduction).

Over the past 2 years, one scoping review and five cross-sectional studies have sought to understand what, how and when gamblers enact self-management strategies (Currie et al., 2019a; Hing et al., 2019a; Knaebe, Rodda, Hodgins, & Lubman, 2019; Matheson et al., 2019; Rodda et al., 2018a; Rodda, Bagot, Manning, & Lubman, 2019). A scoping review by Matheson et al. (2019) identified 35 articles with 6415 adult gamblers who had engaged with strategies to limit or reduce their gambling. Strategies included in the study were self-management, behavioural, cognitive, coping, self-directed CBT, workbooks, booklets and toolkits and personalised feedback tool. Most studies examined self-exclusion (39%) and the use of workbooks (35%). In terms of strategies, they also reported the use of behavioural strategies (e.g., money and time limiting, alternative activities), cognitive strategies (e.g., changing irrational thoughts) and coping strategies (e.g., relaxation, problem solving, mindfulness). This study concluded that given that a minority of people with gambling concerns seek treatment, that stigma is an enormous barrier to care, and that problem gambling services are scarce and most do not address multimorbidity, it is important to examine the personal self-management of gambling as an alternative to formalized treatment.

Rodda et al. (2018a) examined the helpfulness of 99 different behaviour change strategies. They recruited 489 Australian gamblers (333 past or current problem gamblers) to determine whether some strategies were perceived as more helpful than others. Using factor analysis, they clustered the 99 different strategies into 15 strategy groupings (e.g., social support, alternatives, substitution). There were differences in the helpfulness of strategies by age and gambling severity. Few strategies were correlated with confidence to manage an urge to gamble. Overall, change strategies were viewed as moderately helpful. The top five strategies were all used by at least 90% of gamblers (e.g., think about how money could be better spent), and these strategies were all cognitive in nature.

A follow-up study by the same team (Knaebe et al., 2019) examined the association between these 15 groups of strategies and comorbidity and gambling severity. Cluster analysis with an Australian sample identified distinct subtypes of current (i.e., low comorbidity, high psychological distress, risky alcohol use and high comorbidity), past (i.e., low comorbidity, high psychological distress and high comorbidity) and non- problem gamblers (i.e., low comorbidity, high psychological distress, risky alcohol use and moderate impulsivity). The most helpful change strategies for current and past gamblers were similar across subtypes (i.e., accept that gambling needs to change, remind yourself of

the negative consequences). Non- problem gamblers reported the most helpful strategy as setting financial limits.

Currie et al. (2019a) sought to identify the most common self-control strategies of people who gamble regularly, the characteristics of those who use them, and assess the effectiveness of limit-setting strategies in reducing gambling-related harm. They recruited a large sample (n = 10,054) of Canadian adults who reported gambling activity in the past 12 months. The most common self-control strategies were setting predetermined spending limits, tracking money spent, and limiting alcohol consumption. The number of self-control strategies used by gamblers was positively associated with gambling involvement, annual income, problem gambling severity and playing electronic gaming machines. Approximately 45% of respondents failed to adhere to self-determined quantitative limits for spending, frequency, and time spent gambling. People who stayed within their gambling limits were less likely to report harm even after controlling for other risk factors. However, the ability to remain within one's personal spending limit decreased for those whose limits exceed \$200 CAD monthly.

Two studies specifically looked at self-management strategies for gambling venues. Hing et al. (2019a) sought to identify a set of strategies that best predicted non-harmful gambling amongst gamblers who are otherwise most susceptible to experiencing gambling harm. Using a sample of 1174 Canadian gamblers, the study reported that nine strategies best predicted non-harmful gambling amongst this sub-sample. The behaviour most strongly associated with reduced harm was 'If I'm not having fun gambling, I stop'. A set of gambling guidelines were proposed based on the top-ranking strategies.

Rodda et al. (2019) developed a 34-item Gambling In-venue Strategies Checklist (GISC) to measure the uptake of strategies to stick to limits in Australian gambling venues. The checklist was administered to 104 EGM players recruited from Victorian gaming venues. Over a 30-day period, participants used an average of 14 different strategies. Two strategies were frequently used by 90% of gamblers: use only the money brought into the venue and only play low denomination machines. Compared to problem gamblers, low-risk and non-problem gamblers more frequently avoided chasing losses, set cues to keep track of time, used only the money brought into the venue, planned in advance their spending, and also viewed gambling as entertainment. Qualitative analysis revealed the top strategies for limiting gambling were to bring in the exact amount of cash and not taking cards and setting a money limit. The measure developed for this study appears to capture a broad range of strategies used by gamblers when engaging with EGM gambling.

#### 4.1.8 *Self-exclusion*

Self-exclusion is when gamblers themselves indicate to gambling hosts that they are not to be allowed access to land-based or online gambling venues. Six studies were identified that examined self-exclusion (Caillon et al., 2019; Lischer & Schwarz, 2018; Luquiens et al., 2019; Luquiens et al., 2018; Motka et al., 2018; Pickering, Nong, Gainsbury, & Blaszczynski, 2019). Three of these studies were from France, and one each from Australia, Switzerland and Germany. One study was a systematic review, one RCT, three cross-sectional and one qualitative. Motka et al. (2018) systematic review sought to determine the characteristics of those who self-excluded as well as the goals and motives of self-exclusion in land-based and online gambling. Self-exclusion was mainly motivated by financial problems, followed by feelings of losing control and problems with significant others. Online self-excluders were on average 10 years younger than land based. The main barriers for self-exclusion were complicated enrolment processes, lack of complete exclusion from all venues, little support from venue staff, and lack of adequate information on self-exclusion programs. Self-excluders from both land-based and online gambling had negative attitudes toward the need of professional treatment.

Over the past 2 years, only one RCT examined the impact of voluntary self-exclusion for online gamblers. Caillon et al. (2019) randomised 60 participants to a temporary 7-day exclusion or to gambling as normal. They reported no impact on gambling expenditure over a 15 day or 2-month period.

The only Australian study on self-exclusion examined consumer perspectives of a multi-venue program. Pickering et al. (2019) sought to determine reasons for non-compliance, low uptake and issues associated with effectiveness. Through a series of 20 interviews with current and former gamblers Pickering et al. (2019) reported that although participants found self-exclusion beneficial there were several shortcomings. These included a lack of information and overly complicated registration processes. Participants also lacked confidence in venues' willingness and ability to identify non-compliant gamblers and highlighted the need for vastly improved detection systems. These findings were consistent with another qualitative study in Switzerland. Lischer and Schwarz (2018) examined workers' notes regarding casino self-exclusion (almost 10,000 exclusions over 10 years) and reported breaches were frequent with most gamblers finding other ways to gamble during the exclusion period. The main reason gamblers gave for wishing to remove their ban was wanting to be able to visit a casino again.

Two studies in France examined self-exclusion from online poker sites (Luquiens et al., 2018; 2019). Luquiens and colleagues (2018) examined account-based gambling data from Winamax gambling provider. This involved 1996 poker players who had self-excluded. They reported two broad reasons for exclusion: problems with gambling or financial. More than two-thirds of the gamblers resumed poker gambling after a first self-exclusion (n=1368), half of them within the first month. Although 60% of first-time self-excluders, self-excluded again (n=822), losses in the month prior to second self-exclusions were greater than losses before the first. A second study by Luquiens et al. (2019) explored the issue of short self-exclusion periods. In a sample of 4451 gamblers, they reported short-duration self-exclusions showed no significant effect on the most heavily involved gamblers. It may be there is a need to tie self-exclusion to something else where self-exclusion is not sufficient.

## 4.2 Treatment outcomes and predictors of engagement

Treatment refers to any intervention that aims to respond to the development of problems with gambling. Historically, treatment has focused on the identification of effective and efficacious therapeutic approaches that can reduce the symptoms of gambling problems and the frequency of gambling (Petry, Ginley, & Rash, 2017). To a large degree, the treatment literature has focused on a single modality (face-to-face) that delivers psychological or pharmacological support. Research indicates that cognitive behavioural therapies (CBT), and to a lesser extent motivational interviewing, has the strongest evidence base and are likely effective approaches to reducing symptom severity and frequency of gambling (Cowlshaw et al., 2012). Unfortunately, most gamblers who develop a problem are unable to overcome systematic or individual barriers to access treatment (Evans & Delfabbro, 2005). As such, there have been increased efforts to explore different ways of linking people with gambling concerns to effective treatment. However, when people do seek treatment, they frequently only access a single-session, and this too means a greater need in understanding the factors associated with engagement and premature drop-out from agreed treatment plans (Merkouris, Thomas, Browning, & Dowling, 2016). Similarly, people harmed by another person's gambling (usually experienced most intensely by immediate family) also tend to disengage prematurely after seeking treatment.

To be included as a treatment study, the participants needed to be either screened for problem gambling or self-reporting a gambling problem. The current review identified two different types of literature associated with treatment: treatment outcomes, and predictors of treatment engagement. Treatment outcomes included any study that examined the impact of treatment on gamblers or their families. This included all study types (pre-post, RCT's) as well as intervention types (CBT, pharmacological) and modalities (face-to-face, online). Included studies for treatment correlates focused on factors that influenced treatment engagement, retention and treatment outcomes.

### 4.2.1 Evidence sources

Between October 2018 and April 2020, there were 45 treatment studies related to the treatment of problem gambling. These included eight systematic reviews (with 5 meta-analyses), 12 RCT's, 11 pre-post or cross-sectional comparisons, 11 exploratory or cross-sectional studies and 3 qualitative studies. Six studies were from Australia, with 15 from Europe, 10 from Canada, four from UK, five from the US, and single studies each from New Zealand, Singapore, Japan, China, and Brazil. The quality of the included studies was moderate to high (69%) with 31% of studies rated as low quality.

Four Responsible Gambling Fund supported research projects are also currently underway. The University of Sydney is conducting an RCT comparing a blended face-to-face with online self-directed modules against face-to-face treatment. Two studies are being conducted examining family members including a systematic review across addictions (Deakin University) and a needs analysis of family members in NSW (Australian National University). Another team at Deakin University are examining the feasibility of a chatbot virtual assistant in facilitating screening, brief messages and referral to Gambling Help services.

Key areas of research over the past 18 months included (i) CBT, (ii) e-therapy including by phone, (iii) pharmacotherapy, (iv) novel or new treatment approaches, (v) family member treatment, (vi) improving access, (vii) factors that influence treatment attrition.

### 4.2.2 Effectiveness

The efficacy and effectiveness over the long term of gambling interventions was reported to be poor. Over the past 2 years, almost all RCT's reported no difference between groups at short- or medium-term follow-up. Furthermore, almost half of RCT's were post-treatment only and there were no longer term follow-ups (see Table 16).



Examination of the four meta-analyses presents a similar set of findings. There was consistency in terms of a reduction in the number of symptoms in the short term. For the most part, longer term follow-up was not conducted (see Table 17). When medium- or long-term follow-up was conducted, the results were mixed or not significant.

Table 16. *RCT studies' duration of follow-up evaluation*

Author, date	Timing of follow-up evaluation*	Outcome at follow-up
Castrén et al. (2019b)	Post-treatment only	-
Cunningham, Godinho, and Hodgins (2019a)	Short term (6 months)	Reduction in number of symptoms at follow-up but no difference between groups
Cunningham et al., (2019b)	Short term (6 months)	Reduction in number of symptoms at follow-up but no difference between groups
Cunningham et al. (2020)	Short term (6 months)	Reduction in number of symptoms at follow-up but no difference between groups
Hodgins, Cunningham, Murray, and Hagopian (2019)	Medium term (12 months)	Reduction in number of symptoms at follow-up but no difference between groups
Jonas et al. (2019)	Medium term (12 months)	Reduction in the number of symptoms compared with a wait-list control but no difference between groups.
Magnusson, Nilsson, Andersson, Hellner, and Carlbring (2019) (family)	Medium term (12 months)	Reduction in number of symptoms for family members but the effects on gambling behaviours were small and inconclusive
Nilsson, Magnusson, Carlbring, Andersson, and Hellner (2019)	Medium term (12 months)	Reduction in number of symptoms at follow-up but no difference between groups
Oei, Raylu, and Lai (2018)	Post-treatment only	
Penna, Kim, de Brito, and Tavares (2018)	Post-treatment only	
So et al. (2020)	Post-treatment only	
Wittekind et al. (2019)	Post-treatment only	

Note: \*Short term (3-6 months), Medium term (approximately 12 months), Long term (approximately 24 months).

Table 17. *Meta-analyses of gambling studies with follow-up evaluation*

Author, date	Timing of follow-up evaluation*	Outcome at follow-up?
<b>Archer, Harwood, Stevelink, Rafferty, and Greenberg (2019) family</b>	5 studies all short term (6 months)	Improved symptoms but no difference between groups

<b>Goslar, Leibetseder, Muench, Hofmann, and Laireiter (2019)</b> pharmacotherapy	90% of studies did not complete any follow-up	Short term improvement. Insufficient studies to determine long term improvement
<b>Maynard, Wilson, Labuzienski, and Whiting (2018)</b> mindfulness	3 of 7 RCT provided follow-up from 3 months to 1 year	Short term reduced gambling behaviours, symptoms, urges and improved financial outcomes.
<b>Quilty, Wardell, Thiruchselvam, Keough, and Hendershot (2019)</b> brief face-to-face intervention	1 short term, 4 medium and 1 long term	Improvement in short term compared with assessment only control. No difference over longer term.

Three broad reviews have been conducted in the treatment spaced between October 2018 and April 2020. Quilty et al. (2019) examined the effectiveness of six in-person brief interventions for problem gambling. These interventions were targeted at those with moderate risk or problem gamblers and included motivational interviewing, PNF and brief advice for up to three sessions. Two studies included group-based interventions. Although individual studies indicated a small reduction in gambling behaviours in the short term, meta-analysis did not find support for in-person brief interventions over the longer term. However, Quilty et al. (2019) also reported that there was no difference between brief and longer-term active interventions. This suggests some utility in brief interventions which may have similar magnitude as more intensive interventions.

Pfund et al. (2020a) conducted a meta-analysis to examine the association between the amount of treatment (i.e., dose) for problem gambling and the outcome of CBT, motivational interviewing and PNF interventions. They identified 14 RCT's (involving 1203 participants) that delivered face-to-face psychological treatment with a therapist. This study explicitly excluded all brief interventions and those delivered via telephone, internet, self-help or any other non-face-to-face setting. The review reported the intended average dose was 6.8 sessions (range 1-30). There was a positive association between the number of sessions intended and the number received with reduced gambling symptoms. Studies that included active treatment seekers reported significantly larger effect sizes than those not actively seeking treatment.

Matheson et al. (2018) conducted a scoping review of the prevention and treatment of problem gambling with older adults. This review identified the inclusion of older people in 188 studies with three restricting the sample to older people. A range of treatment options in these 188 studies were CBT, mindfulness, motivational interviewing and exercise, integration of support for or from family, group therapy, mutual-aid, or pharmacological treatments.

#### 4.2.3 *Help-seeking*

Two studies examined trends in help-seeking. Sharman, Murphy, Turner, and Roberts (2019b) examined patterns in gambling and mental health amongst UK and Irish treatment seekers. Secondary data sourced between 2000 and 2015 from the main residential treatment centre (n=768) indicated increases in online gambling, sports betting, poker and fixed odds betting but decreases in horse and dog racing and lottery. Over more recent years there were a higher proportion of gamblers entering treatment who had attempted suicide (30% of clients). In addition, there has been an increase in mental health issues.

Rodda, Dowling, and Lubman (2018b) conducted a pre-post study of gamblers accessing online counselling through Gambling Help Online in Australia. This study reported that the way in which help-seeking was measured had a significant impact on the reported rates of help-seeking. They found that asking clients 'have you ever sought help for your gambling' (yes/no) resulted in 22% agreement. In contrast, asking whether the person had engaged in any one of 14-items on the Help Seeking Questionnaire yielded a lifetime help-seeking rate of 70% (exclusive of self-help). This scale includes intensive (e.g., face-to-face, groups, pharmacological) and less intensive (helpline, online). It also

included self-help (e.g., talking to a friend, implementing a strategy). This finding indicated that gamblers may be active in help-seeking, but this activity is not being detected with current measurement tools.

#### 4.2.4 *Cognitive Behavioural Therapy*

Studies examining CBT conducted online are considered separately in the next section. Three studies examined CBT including an RCT, a quasi RCT, and a pre-post study (Garcia-Caballero et al., 2018; Oei et al., 2018; Zhuang et al., 2018). An Australian study by Oei et al. (2018) examined the effectiveness of a self-help CBT program against a waitlist control. A total of 55 participants were recruited from the community across Queensland. Participants in the treatment condition completed a 7-session self-help manual that included cognitive correction of erroneous perceptions about gambling and problem gambling, problem-solving skills training and relapse prevention. Oei et al. (2018) reported significant reductions in gambling behaviours as well as depression and anxiety symptoms.

Garcia-Caballero et al. (2018) conducted a pre-post study testing the impact of a Motivational interviewing Intervention with CBT with 18 people with problem gambling. The treatment involved six months (bi-weekly 40-minute sessions) of a combination of Motivational Interviewing techniques aimed at increasing self-efficacy followed by CBT (i.e., stimulus control, cognitive restructuring and relapse prevention). This pre-post study indicated significant reductions in gambling behaviours, impulsivity and quality of life.

Zhuang et al. (2018) conducted a quasi-experimental study with male problem gamblers in Hong Kong. A total of 84 participants were recruited from the main gambling counselling centre and allocated to group counselling with a CBT therapist (3 hours each). Groups completed either eight sessions of CBT or a control condition involving organised social activity. The focus of CBT included enhancing motivation for change, identifying triggers and recognising urges. Participants then completed activities on gambling distortions and beliefs and were taught new cognitive and behavioural responses aimed at altering gambling behaviours. The CBT group reported stronger improvements than the social activity control group. Improvements included significant decreases in the severity of gambling, gambling-related cognitions (i.e., interpretive bias), negative psychological states (i.e., stress), and money spent on gambling in the past month.

Two explorative CBT studies were conducted examining money control and cue-receptivity following CBT treatment. Riley et al. (2018a) recruited 20 Australian gamblers (referred by a local course diversion program) into a study aimed at reducing responsiveness to cues to gamble. This pre-post pilot required participants to use a portable heart monitor to trigger relaxation practice. This study found that with therapist oversight, this intervention significantly reduced responsiveness to gambling cues.

Granero et al. (2020) conducted a pre-post study with 998 gamblers accessing a CBT program in Spain. They examined the degree to which being in control of money for gambling predicted treatment outcomes. This study reported the risk of drop-out during therapy was lower in patients who reported money control, but there was no association with rate of relapse. However, the study found that at the end of the intervention, clients with higher money control had lower levels of gambling severity and comorbid psychopathology.

#### 4.2.5 *E-therapy and telephone counselling*

E-therapy includes a range of internet-delivered interventions that support a person-to-person interaction online. A scoping review by van der Maas et al. (2019) identified 27 different studies in gambling that had delivered interventions via the internet. The review reported that a wide range of interventions made use of internet resources included text-based interactions with counsellors and peers, automated PNF on gambling behaviours, and interactive CBTs. The quality of studies was mixed (very few RCT's or comparison groups) and follow-up time points were short (range of 3

weeks to 3 months). However, the review concluded that this form of treatment helped reduce barriers to access.

Two studies examined e-therapy tools that involved web-based counselling, email, and a Chatbot delivered program. Both of these studies were RCT's and were delivered without the oversight of a therapist. Jonas et al. (2019) compared the effectiveness of web-based counselling delivered over 50 days versus email-based counselling and a wait-list control. At three-month follow-up evaluation, participants in the web-based counselling group and the email counselling group reported improved symptoms compared with the wait-list control. So et al. (2020) investigated the effectiveness of an unguided chatbot-delivered CBT intervention through an instant messaging app. The app delivered daily self-monitoring, personalised feedback and supportive messages over a 28-day period versus bi-weekly messages only. At 28-day follow-up evaluation, 77% of intervention participants stayed in the program but there was no difference in gambling symptoms between groups.

In addition to the CBT studies detailed in the previous section, four were delivered via the internet (Cunningham et al., 2019a; Cunningham et al., 2020; Cunningham et al., 2019b; Hodgins et al., 2019). All of these iCBT studies were RCT's and all involved a four-module program (Becoming a Winner) developed by David Hodgins in Canada. All interventions were delivered online and without any therapist oversight or support. Interventions targeted those at moderate risk or problem gamblers and two targeted specific comorbidities (alcohol and depression). Sample sizes ranged from 187 to 321 with follow-up evaluation occurring at between 6 and 12 months. Overall, the findings from these studies were mixed, whereby all treatment arms reported a reduction in gambling symptoms, but there was no difference between groups at follow-up evaluation. Comparison groups for these studies ranged from no treatment, self-help only without treatment for depression or alcohol and brief normative feedback. A limitation of these studies was that the treatments for depression and alcohol were delivered to people not seeking treatment for these conditions (despite a problem being detected) and the treatment was not integrated into the gambling treatment (i.e., these were separate treatments that were offered via a link and not tailored to gambling populations).

Two qualitative studies explored the acceptability and delivery of iCBT. Sanchez et al. (2019) qualitative study explored factors that shape the acceptability of internet interventions. From a clinician perspective, there were concerns about the development of protocols and policies for service delivery and the potential impact on relationships. From a client perspective, there was a greater focus on availability and access. Another qualitative study by Rodda et al. (2019) explored the experiences of therapists providing support to gamblers in iCBT programs. This Australian study with seven Gambler's Help counsellors reported barriers and facilitators to client suitability and screening, program content and modality acceptability, participant information and management, email communication and ongoing service integration. Overall, experiences and perceptions of therapists were positive, notwithstanding barriers concerning the assessment of participant suitability, participant management systems and low participant engagement.

Two studies examined the impact of telephone interventions. Ranta, Bellringer, Garrett, and Abbott (2019) examined the impact of a brief telephone intervention over a 36-month period in New Zealand. Following 131 callers to the national helpline, there was a large reduction in gambling severity with the greatest reduction in the first 12 months. This study also reported that 74% of helpline callers reported depressive symptoms, and this reduced to 41% at 36 months. In another helpline study, Asharani, Amron, Ng, Varghese, and Cheok (2019) examined utilisation patterns of helpline and web-based chat counselling at the government-funded service in Singapore. Observing 8556 service users, they reported the average calls per month was 1827 with 185 referrals to the treatment clinic (80% attended). Approximately 15% of calls were from family members.

#### 4.2.6 *Pharmacotherapy*

Two systematic reviews have examined pharmacological treatments for problem gambling. Goslar et al. (2019) meta-analysis identified 39 studies with 1340 participants who received pharmacological or

combined pharmacological and psychological treatment. Overall pharmacological treatments were associated with a medium to large reduction in gambling symptoms at least in the short term. When compared with a placebo-controlled intervention, opioid antagonists (e.g., naltrexone) and mood stabilizers had the strongest impact when delivered with a psychological intervention. Kraus, Etuk, and Potenza (2020) conducted a systematic review of 19 pharmacological RCT's against a placebo. This review also reported that opioid antagonists showed promise, but that better outcomes were more likely when combined with psychological treatment.

The current review identified two studies examining pharmacotherapy for problem gambling, neither in Australia. Ward, Smith, and Bowden-Jones (2018) examined the use of naltrexone in a pre-post study (n=14) over a 6-week period. They reported significantly reduced gambling severity. Similarly, Castrén et al. (2019b) also examined the use of naltrexone over an 8-week period (n=20) also reporting reduced severity but not reduced gambling expenditure.

#### 4.2.7 *Novel and new treatment approaches*

A total of seven studies addressed novel and new approaches including one review and one study examining third wave CBT (i.e., mindfulness) (Maynard et al., 2018; van der Tempel et al., 2020). Other approaches included two studies examining transcranial magnetic stimulation (Cardullo et al., 2019; Pettoruso et al., 2020) and one each looking at psychodynamic therapy (Mooney, Roberts, Bayston, & Bowden-Jones, 2019), cognitive bias modification (Wittekind et al., 2019) and the impact of an exercise program (Penna et al., 2018). The systematic review and meta-analysis identified 13 studies that reported the use of mindfulness for reducing gambling symptoms (Maynard et al., 2018). Most sessions were individual and face-to-face with one group-based intervention and up to 12 sessions. Meta-analysis indicates moderate to large effects of mindfulness on gambling behaviours and symptoms, including urges and gambling expenditure.

#### 4.2.8 *Affected others treatment*

Affected others (i.e., family members) have been identified as potentially important in supporting a gambler to seek treatment and as ongoing support. Affected others also have their own needs and may seek treatment from Gambling services. The current review identified six studies that have examined the effectiveness of treatment for family members, including one systematic review, two RCT's, and three cross-sectional studies.

Archer et al. (2019) systematic review and meta-analysis examined the effectiveness of 20 Community reinforcement and family training (CRAFT) based interventions for addictions (5 studies with family member of gamblers). Developed for alcohol reduction, this program aims to increase treatment seeking by the gambler through the family member. The review found CRAFT to be twice as effective as control groups for addictions broadly. However, when isolating the sample to family of gamblers only (just the 5 studies with gambling samples), the review indicated that CRAFT performed no better than control conditions.

Two Swedish RCT's were identified that were available to family members harmed by gambling. Magnusson et al. (2019) examined the effectiveness of internet-delivered CRAFT program for family members of treatment refusing problem gamblers versus a wait-list control. At 12-month follow-up evaluation, they reported improvement to the family members' well-being but no change to the gamblers rate of treatment-seeking. Nilsson et al. (2019) examined the impact on a couples-based CBT program involving either the couple or gambler only program. They reported improved gambling severity but no difference between groups. However, the couples group reported a higher rate of treatment-seeking than the gambler only group.

Three cross-sectional studies examined the experiences and treatment needs of family (Buchner, Koytek, Wodarz, & Wolstein, 2019; Petra, 2020; Rodda, Dowling, Thomas, Bagot, & Lubman, 2019). Rodda et al. (2019) study involving 62 online treatment seekers in Australia, reported 50% wanted

advice on how to help a person with a gambling problem and 28% wanted help for themselves (e.g., how to cope with a gambling problem). A further 22% of participants wanted to help both the gambler and themselves. These findings suggest that interventions need to be able to accommodate both a gambler-focused and family-focused approach. Buchner et al. (2019) examined the experiences of 126 family members who accessed a self-help module for gambling. They concluded that online treatments were a viable way of reaching more family members in Germany.

#### *4.2.9 Improving access*

Two studies examined barriers to treatment. Gannon, Delfabbro, and Sutherland (2020) conducted a series of 10 qualitative interviews with rural treatment seekers from SA gambling services. Particular issues relevant to rural gamblers that set them apart from metropolitan gamblers were limitations in leisure choices in rural areas; the problem of social familiarity in relation to anonymous help-seeking; and the dearth of specialized services. This study highlighted the need to consider the role of rural-specific barriers, motivating and protective factors in developing service delivery models and specialised interventions for problem gambling in rural and remote communities. A second qualitative study conducted in Finland by Itapuisto (2019) recruited 10 problem gamblers from different gambling treatment services to determine barriers to treatment and help-seeking. They found that for some treatment seekers family members played a crucial role in the decision to access help. For others, it was the experience of having hit 'rock bottom' which prompted the action.

#### *4.2.10 Factors that influence treatment success and engagement*

Treatment attrition (also referred to as dropout), refers to prematurely ending a course of treatment before it is complete. Two studies have examined this issue with one looking at predictors of dropout in the UK and another examining methods to increase attendance at treatment (Pfund, Whelan, Peter, & Meyers, 2020b; Roberts, Murphy, Turner, & Sharman, 2020a).

Roberts et al. (2020a) conducted a secondary analysis of 658 clients accessing a residential treatment facility to determine the predictors of treatment dropout. They found half of all clients stopped treatment prematurely. Predictors of treatment dropout included older age of the client, higher levels of education, higher levels of debt, online gambling, gambling on poker, shorter duration of treatment, higher depression, experience of previous treatment programs and medication, and adverse childhood experiences.

Pfund et al. (2020b) examined whether a motivational letter can increase attendance to gambling treatment. This RCT involving 69 clients tested the effectiveness of a mailed letter and reminder telephone call before their initial session to improve attendance. Letters were mailed within 12 hours of contacting the clinic, and reminder calls were placed one business day before the initial session. Clients who received the letter plus reminder calls were more likely to attend the initial session than clients who received a reminder call only. Clients receiving the letter were also more likely to reschedule their initial session and less likely to not show up than clients receiving the reminder call only. There was no significant difference in attendance at subsequent sessions. These results suggest that mailing a similar letter to prospective clients of psychological treatment for gambling disorder is worthwhile, given the associated ease and low cost.

Four studies examined client factors that might impact on their ability or willingness to engage in treatment. Three of these studies (all from Spain) reported that impulsivity was associated with treatment dropout, relapse and low compliance with treatment (Jara-Rizzo et al., 2019; Mallorqui-Bague et al., 2018; Mestre-Bach et al., 2019). Another study examined the impact of comorbid gambling and substance use disorder with a series of 65 interviews with substance use treatment seekers (Wieczorek & Dąbrowska, 2020). This study reported that people with comorbidity experienced difficulties with maintaining gambling abstinence and an escalation of one disorder due to the treatment of another disorder. This finding suggests that supporting the treatment of gamblers in substance use services may be helpful.

### 4.3 Vulnerable groups

This section reports on the attitudes and behaviours of people who are at increased risk for gambling problems. Based on discussions with the funder and the findings of the previous report, vulnerable groups that were of particular interest included youth, Aboriginal people and those with CALD backgrounds. Based on the 2018 rapid review (Lawn et al., 2018), it is likely that the literature on vulnerable groups focuses on participation and rate of problem gambling rather than specifically targeting attitudes. Where this is the case, the current study will also report on participation and problems. As such, the inclusion criteria focused on Australian studies for Aboriginal and CALD populations, with international literature on youth included where deemed generalizable and relevant to the Australian context.

#### 4.3.1 Evidence sources

Between October 2018 and April 2020, there were 44 studies related to gambling attitudes, participation and problems in vulnerable groups. These study designs included 5 systematic reviews (inclusive of scoping or rapid reviews), 2 non-systematic reviews, 1 cross-sectional comparison, 34 exploratory or cross-sectional studies and two qualitative studies. Ten studies were from Australia with 14 from Europe, eight from USA, four from Canada, seven UK, and a single study from New Zealand. Overall the quality of studies was low with almost all being cross-sectional comparisons.

Four Responsible Gambling Fund supported research projects were also identified. These include a study by CQU which explores the changing landscape of gambling in childhood, adolescence and young adulthood. Another study on youth by CQU examines the prevalence and attitudes towards gambling as well as the potential migration from gaming to gambling. This study also examines the impact of advertising and normalisation of gambling for young people. Western Sydney Community Forum is conducting a study which aims to develop a practical framework for offering a culturally responsive approach to addressing problem gambling. Western Sydney University are working on screening for gambling in comorbid populations in a hospital setting.

Sharman, Butler, and Roberts (2019a) conducted a descriptive systematic overview of vulnerable populations and gambling. The review identified 257 studies which examined attitudes and beliefs in the following groups: young people and adolescents, older adults, women, veterans, indigenous peoples, prisoners, and low socio-economic/income groups. Sharman et al. (2019a) reported some risk factors associated with problem gambling appeared consistently across most groups, including being male, co-morbid mental and physical health conditions, substance use disorders, accessibility and availability of gambling, form and mode of gambling, and experience of trauma.

Further exploration of specific vulnerable groups includes young people and older people; Aboriginal and CALD people; at-risk populations; those with economic hardship; and other vulnerable groups and are detailed next.

#### 4.3.2 Young people and older people

There were 19 studies that specifically considered age-groups of younger and older people. Wardle (2019a) conducted a rapid review on qualitative research on youth gambling (defined as aged up to 24 years). A total of 21 articles were included representing 16 unique studies. Studies focused on youth perceptions (e.g., that it was normal and embedded in everyday life) and motivations for gambling (e.g., hope of winning, prestige). Factors influencing behaviour included families (e.g., intergenerational gambling), peers (e.g., gambling within groups), technology (e.g., ease of gambling), and advertising (e.g., advertising prompting a desire to gamble). The review identified multiple gaps in knowledge, specifically around the role of technology in shaping gambling behaviours beyond consideration of access and availability.

The Gambling Commission (2018) annual UK survey sought to determine participation and rates of problems in 2,865 youth (11-16-year old). This survey was conducted in schools with questionnaires completed in person or online. The Gambling Commission reported 14% of 11-16 year olds had spent

their own money on a gambling activity in the week prior to taking part in the study. The research also indicated that 1.7% of 11-16-year olds were problem gamblers, 2.2% were at low risk. Another UK report by Emond, Griffiths, and Hollen (2019) presented an eight year follow-up assessment on a cohort of 3841 at-risk gamblers. The patterns of moderate risk/problem gambling were set by the age of 20 years. Many young people had tried different forms of gambling between 17 and 24 years, but the only activity showing a consistent increase over this age range was online gambling and betting.

The findings from the two UK studies (Commission, 2018; Emond et al., 2019) were similar to a large scale European cross-sectional study conducted by Andrie et al. (2019) involving 13,284 adolescents investigating patterns of gambling. Andrie et al. (2019) reported 12.5% of the participants reported gambling activities either online or offline in the previous year. Of the study participants, 3.6% were at risk or had a gambling problem (higher proportion among males, older age groups, parental educational level was lower/middle, no siblings). Being at risk or having a gambling problem was associated with lower age at first use of the internet, lower school grades, using the internet 6–7 days per week, and problematic internet use. At risk and problem gamblers had higher scores on all scales of problem behaviour and lower scores (lower competence) on activities and academic performance.

Multiple studies have looked at youth correlates and problem gambling. Jauregui and Estevez (2019) reported gambling motives such as gambling to cope was associated with severity of gambling problems. Rider, McMorris, Gower, Coleman, and Eisenberg (2019) reported transgender/gender diverse adolescents were at higher risk for gambling problems developing. Consistent with the systematic review, Savolainen, Sirola, Kaakinen, and Oksanen (2019) reported peer group was influential in adolescent gambling participation. Smith, Chambers, Abbott, and Signal (2019) reported that children in New Zealand were exposed to high amounts of advertising that normalised gambling (mostly lotteries in convenience stores).

Six studies examined substance use and gambling in adolescence. Vitaro et al. (2019) reported on a longitudinal twin's study in Canada (n=373 pairs). The study reported a small but significant unidirectional association from substance use to gambling participation. The authors suggested that gambling and substance use may share a common genetic basis especially in late adolescence. Other studies indicate a positive association between gambling and alcohol consumption and impulsivity (Kaltenegger, Laftman, & Wennberg, 2019; Martínez-Loredo, Grande-Gosende, Fernández-Artamendi, Secades-Villa, & Fernández-Hermida, 2019), substance use and violence (Zhai, Duenas, Wampler, & Potenza, 2020), depressive symptoms and alcohol use (Jun, Sacco, & Cunningham-Williams, 2019), and stimulant use (Richard, Potenza, Ivoska, & Derevensky, 2019b).

Two Australian studies examined the association between gambling participation and problems in domestic and international students. Mond et al. (2019) examined gambling participation, problem gambling and reasons for gambling among international university students in Tasmania. Recruiting a sample of 1395 (n=382 international n=1013 domestic), they reported international students gambled less frequently than domestic but reported almost twice the rate of problem gambling. Dowling, Brown, Aarsman, and Merkouris (2020) reported similar findings and recommended further research into the risk and protective factors associated with international student gambling in Australia.

Most of these studies on age vulnerabilities were focused on adolescents, and to a lesser extent university students. In addition, three studies specifically examined older people and gambling. Matheson et al. (2018) conducted a scoping review on gambling and older people and identified very limited research on prevention or treatment in this group. In terms of participation, studies in Canada (van der Maas et al., 2018) and Spain (Granero et al., 2019) reported a lower rate of participation and problems than the general population. However, these studies may not be representing more senior people given the minimum age cut-off was 55 and 50 respectively.

#### 4.3.3 CALD and Aboriginal people

There were four studies which examined CALD and Aboriginal people. Two studies examined CALD populations (one systematic review and one survey) and two studies examined gambling among



Aboriginal people (two qualitative studies). Wardle, Bramley, Norrie, and Manthorpe (2019) rapid review identified 38 studies related to migrants and gambling related harm. They reported reasons for gambling included relieving stress (e.g., fitting in, unemployment), advertising exposure and being targeted with tailored marketing and access to gambling opportunity which may not have been available at home. Protective factors included religious and moral beliefs, but these may also act as a barrier to help seeking. Overall, the review concluded that participation in gambling for migrants was lower than the general population, but those that do gamble, do so more frequently and experience more problems. Awaworyi Churchill and Farrell (2020) examined the role of ethnic diversity in gambling participation with HILDA data (n=14061). This study reported ethnic diversity was positively associated with gambling. The authors concluded that policies that promote social capital in at-risk communities (e.g., addressing social isolation) may assist in reducing gambling problems.

Two studies with small samples investigated gambling in Aboriginal people in regional Victoria. MacLean, Maltzahn, Thomas, Atkinson, and Whiteside (2019) conducted interviews with 50 Aboriginal people to explore harms and help-seeking. The study indicated gambling was perceived to hold some benefit (e.g., community gathering) but also harm (e.g., domestic violence, conflict, isolation and shame). Venues were perceived as safe and welcoming but at the same time the source of harm. The authors concluded that the intermingling of benefits and harms described above supports the need for a multi-faceted response to gambling in Aboriginal communities, which includes harm reduction as well as supply restriction and treatment. Another study by the same research group examined the experiences of community based Bingo players. Maltzahn et al. (2019) interviewed 26 Aboriginal gamblers and reported that for many, bingo was a means of social connectedness, fun, and excitement. However, for some it did mean exhausting the family budget, family conflict and encouragement to commence other forms of gambling. The authors noted that attempts to commercialise or regulate community bingo would be damaging to the community and should be avoided.

#### *4.3.4 At-risk professions*

There were eight studies that considered at-risk professions. Five studies examined professions that were associated with higher rates of gambling problems. These included emergency workers (fire-fighters) (Cowlshaw et al., 2020), military (Gallaway et al., 2019; Grubbs, Chapman, & Shepherd, 2019; Milton et al., 2019) and those working in the finance industry (Cox, Kamolsareeratana, & Kouwenberg, 2020). A large-scale study involving fire-fighters in South Australia recruited 566 workers to explore vulnerability to gambling and other addiction and mental health issues. They reported elevated rates of problem gambling that are potentially triggered by traumatic events in the workplace (Cowlshaw et al., 2020).

Three studies examined current and past military personnel and reported similar high rates of gambling problems (Gallaway et al., 2019; Grubbs et al., 2019; Milton et al., 2019). One of these studies by Milton et al. (2019) included Australian servicemen within their international sample of 10753 participants. They reported a higher rate of participation in both current and former-serving military samples compared to the general population. Resilience was the only predictor of gambling problems from a whole range of different demographic and psychological variables. The authors conclude that routine screening is needed, and resilience focused interventions needs to be developed.

#### *4.3.5 Economic hardship*

Five studies were focused on gambling behaviours during recession periods and the role of financial institutions. Economou et al. (2019) examined gambling behaviours and problem gambling in Greece and reported no change to the rate of participation in gambling during recession. They did however find that those who started gambling during the recession were more likely to experience problems. Gabrielyan and Just (2020) tracked sales of lottery tickets in Maine (USA) and reported that an increase in unemployment was associated with a small but significant increase in lottery purchases. Hakansson and Widinghoff (2020) study examined the impact of debt and problem gambling

symptoms in a sample of 1004 online gamblers. They reported a history of significant debt was associated with engaging in multiple forms of gambling – specifically online casino gambling and live sports betting.

Two Australian reviews investigated the role of financial institutions in supporting people with gambling problems (Swanton & Gainsbury, 2020; Swanton, Gainsbury, & Blaszczyński, 2019). These reviews reported that there was very limited investigation of consumer credit use by gamblers, despite this being a core criterion for diagnosis of problem gambling. The authors also concluded that financial institutions could be doing more to support people with gambling problems.

#### *4.3.6 Other vulnerable groups*

Seven studies addressed other vulnerable groups. Five cross-sectional studies examined other themes around vulnerable populations including family violence (Dowling et al., 2019; Roberts et al., 2020b), comorbidity (Kim et al., 2018; Kotter, Kräplin, Pittig, & Bühlinger, 2019), and homelessness (Machart et al., 2020). A consistent theme across each of these studies was the association between family violence, comorbidity and homelessness and increased rates of gambling problems. Two of these were studies investigating interpersonal violence (Australia and UK), and both concluded that around one-quarter of gamblers in treatment were either the victim or perpetrator of family violence (Dowling et al., 2019; Roberts et al., 2020b). Dowling et al. (2018b) found that screening for interpersonal violence was important when working with gamblers as was addressing psychological distress, symptoms of PTSD, alcohol use and impulsivity that may contribute to interpersonal violence.

Two studies examined problem gambling and offenders including one systematic review (Banks, Waters, Andersson, & Olive, 2019) and one study examining the prevalence of gambling problems in Finnish prisons (Lind, Salonen, Jarvinen-Tassopoulos, Alho, & Castren, 2019). Banks et al. (2019) systematic review focused on the prevalence of problem gambling in offenders. The review identified 12 studies involving 3892 participants from Australia, Canada, New Zealand, the UK and USA. They found between 6% and 73% of inmates met diagnostic criteria for problem or pathological gambling across. The authors concluded that interventions across each stage of the criminal justice system may be needed.

## 4.4 Emerging technology

Trends in technology refers to any gambling related activity that involves new or emerging technology. Online or internet betting has only been available to gamblers for less than ten years. However, with faster internet and expansion in smart phone capability comes the potential for new ways of gambling or new types of gambling opportunities. New technologies also offer unprecedented opportunities to deliver innovative and immediate prevention, harm minimisation and treatment (Danielsson, Eriksson, & Allebeck, 2014; Lawn et al., 2020b).

The current review sought to identify trends in technology that were new or emerging, and those that may not have been captured in the 2018 rapid review. We did not include in this section internet-enabled gambling that was not new (i.e., online sports betting). Note that these trends are captured in other sections of this report (e.g., prevalence studies). Similarly, internet delivered interventions have been available to gamblers for more than 20 years when the first online community forums were created in the UK. It is likely that these too are discussed in the prevention and harm minimisation and treatment sections.

### 4.4.1 Evidence sources

Between October 2018 and April 2020, there were 25 research articles examining emerging issues in technology and gambling. These articles included one rapid review and 3 non-systematic literature reviews, one RCT, five pre-post or cross-sectional comparisons and 15 exploratory or cross-sectional studies. Of these studies, seven originated in Australia, six in the US, four in Europe, six in UK and two were from Canada. The overall quality of the evidence was low with almost all identified studies being cross-sectional studies or non-systematic reviews.

Responsible Gambling Fund supported research projects are currently underway. This includes a GRA funded research project led by CQU which re-examines the 2014 interactive gambling study and the impact of changes in the gambling environment over the past 6 years. To further understand the convergence of gaming and gambling in Australia, CQU are conducting a study on whether loot boxes are grooming youth for gambling. In terms of other developments, one study is examining the impact of structural characteristics in smartphone betting (CQU) and another looking at the impact of a new 'cash-out' wagering product (University of Sydney).

Key areas of research included (i) internet gambling, (ii) convergence of gaming and gambling, and (iii) other developments. Others included expansion in gambling options, currency options for gambling and the use of data science for understanding patterns of gambling and prevention.

A recent review was published that spanned all areas of interest. Lawn et al. (2020) published a summary of emerging technologies drawn from the 2018 rapid review prepared for the Responsible Gambling Fund. They reported that emerging areas were video gaming and gambling, the expansion of the sports betting market, changes in EGM characteristics, and articles exploring new technologies and trends in advertising and inducements.

### 4.4.2 Internet gambling

Five studies specifically explored trends in internet gambling with additional studies focusing on e-sports and another on simulated gambling. Edson and LaPlante (2020) conducted a longitudinal analysis over a 27-month period of fantasy sports players (n=11388). The study reported the majority of registered players had elevated initial engagement in the site followed by decreasing engagement over time. However, for the top 1% of players, there was an increasing engagement over time. Aggregate playing trends for all groups of players were seasonal, with more engagement during National Football League seasons and less engagement during off-seasons. From the same research group, Nelson et al. (2019) also examined patterns of daily fantasy sport play (n=10385) and reported an average median participation of two contests per day with a single entry for each contest. The median entry fee across the year was US\$87 with an overall average median loss of US\$30. The

researchers concluded that overall fantasy sports did not appear associated with problems for most people.

Lopez-Gonzalez, Russell, Hing, Estevez, and Griffiths (2019) conducted a cross-cultural study of weekly sports bettors in Australia and Spain. The aim of the study was to assess the similarities and differences across a range of gambling related variables for the two different jurisdictions. The study recruited 738 Australians and 361 Spanish people who had gambled online and reported high rates of problem gambling among sports bettors in both countries. There were consistent similarities in the positive association between problem gambling, in-play betting and offline betting. The authors concluded there may be a common pattern of risk factors for sports betting that could be tackled with worldwide regulation.

Another study by the same group of researchers led by Russell, Hing, Browne, Li, and Vitartas (2019) examined the profile of in-play bettors who engaged in micro-events (referred to as micro-betting). They surveyed 1813 Australian sports bettors to determine demographic, behavioural and psychological characteristics of micro-event bettors, and of those who place a higher proportion of their bets on micro-events. The research reported that bettors who were more highly engaged were more likely to bet on micro events (where they placed more of their bets). Of those who bet on micro events, a staggering 78% met criteria for problem gambling, and only 5% non-problem gambling. In addition, the researchers found those engaged in micro-betting were likely to be younger, well-educated and single. They were also likely to be engaged in a wider variety of gambling activities and to have high trait impulsivity. The authors concluded that micro-event betting appears to appeal almost exclusively to bettors with gambling problems, so a ban would represent a highly targeted intervention to reduce gambling-related harm.

Rockloff, Browne, Greer, Armstrong, and Thorne (2019) conducted a cross-sectional study examining the profile of in-play bettors who engage in betting on micro-events. A total of 736 EGM gamblers completed an initial survey on their current and retrospective use of simulated and real-money gambling products. By invitation, 556 people (314 male) from the initial survey also volunteered for a 24 week follow-up study where approximately half (48.2%) were randomly assigned to play a simulated game 'Lucky Lolly Slots' for at least 5 minutes each week. Simulated gambling sessions were recorded for both Lucky Lolly Slots and any other gambling apps played by the participants. Results indicated that people who had played gambling-themed EGM apps at some point in their lifetime had a higher frequency of play on real-money EGMs and were more likely to admit to current gambling problems. In the 24-week trial, people's app play in week one reliably predicted increases in real-money gambling the following week. The researchers concluded that gamblers who play simulated games are likely to be influenced to gamble more on real-money forms of gambling. The study raises particular concerns about the widespread availability and popularity of such gambling-themed simulators amongst children and adolescents.

#### *4.4.3 Convergence of gaming and gambling*

Two cross-sectional international studies examined the convergence of gaming and gambling. Karlsson, Broman, and Håkansson (2019) conducted a general population survey involving 1593 people and reported a significant association between problem gaming, problematic internet use, and problem gambling. They suggested that these constructs may interact or may share similar risk factors. Molde et al. (2019) conducted a longitudinal study to explore the directional association between problem gaming and problem gambling. Recruiting 4601 adults and following them over a two years period, Molde et al. (2019) reported a positive association between scores on problematic gaming and later scores on problem gambling. They found no evidence of the reverse association and suggested that video gaming problems may be a gateway to later problem gambling.

Eleven studies examined loot boxes and the overlap between loot box consumption and gambling problems. Loot boxes (or mystery boxes) are an attempt by the gaming industry to monetise console and online games. Delfabbro and King (2019b) review of issues around loot boxes and in-game monetization reported that loot boxes operate on a variable ratio reinforcement schedule (similar to

gambling) where the player does not know the outcome of their purchase in advance. Furthermore, the odds of winning a desirable prize are similar to gambling whereby rare or highly sought-after prizes are awarded infrequently. Gamers do not need to play loot boxes to participate in gaming but more frequently the content of loot boxes provides players a competitive advantage placing pressure on individuals to pay to play.

From a gambling perspective, these products are a concern because they have similar characteristics to gambling. Cross sectional surveys with adults in the UK, USA, Canada, and New Zealand indicate people who spend money on loot boxes are more likely to also have problems with gambling (Brooks & Clark, 2019; Drummond, Sauer, Ferguson, & Hall, 2020; Li, Mills, & Nower, 2019; Zendle & Cairns, 2018; Zendle & Cairns, 2019; Zendle, Cairns, Barnett, & McCall, 2020a). These findings have also been replicated with adolescents. Kristiansen and Severin (2020) and Zendle, Meyer, and Over (2019) both report a link between problem gambling and loot box consumption. Part of the concern is the proliferation of loot boxes. Zendle, Meyer, Cairns, Waters, and Ballou (2020b) study reported almost 60% of the top games on the Google Play and iPhone games contained loot boxes. The proposed mechanisms for the connection between loot boxes and gambling include increased physiological arousal in response to the gambling like experience (Brady & Prentice, 2019), erroneous cognitions and misunderstanding chance which is also common in gambling (Brooks & Clark, 2019), as well as near-misses whereby the player appears to almost win a desirable prize (Zendle et al., 2020a).

Wardle (2019b) examined similar issues with 2881 young people (11-15) in the UK. They reported that betting on skins (an item of value within games) and other forms of in-game gambling increased with age. Concordance of skins trading was greatest for those who also gambled online. At-risk and problem gambling rates were significantly higher among those who had both bet with skins and engaged in other forms of gambling activity in the past month, than those who had gambled on other activities alone.

#### *4.4.4 Other developments*

Five studies examined other developments including e-sports (i.e., a sporting event using video games) online currency and the use of data science across both prevention, harm minimisation and treatment.

Macey and Hamari (2019) assessed participation rates and demographic characteristics of e-sport spectators who gamble via an international online survey. In a convenience sample of 582 people in Finland, Macey and Hamari (2019) reported an association between increased watching of e-sport and betting on e-sports. The study also reported that of those betting on e-sports around half scored as having some gambling problems.

Mills and Nower (2019) examined the use of cryptocurrency trading among regular gamblers. In a sample of 876 gamblers who had gambled at least once in the past year, Mills and Nower (2019) reported a strong link between crypto-trading and problem gambling and weak associations with depression and anxiety symptoms. The authors also pointed to earlier studies that implicated personality variables such as sensation seeking or impulsivity with trading and gambling. They suggested that for those with gambling problems and trading, interventions should address sensation seeking and impulsive decision making.

Gainsbury, Angus, and Blaszczynski (2019) examined the association between online and offline gambling and levels of psychological distress. They reported that among internet gamblers, playing both online and land-based EGMs were strongly associated with problem gambling. King and Delfabbro (2019) conducted a review (non-systematic) of work exploring potential new and emerging EGM features. Their review identified the need for access to genuine player data in order to develop appropriate and tailored interventions.

Deng, Lesch, and Clark (2019) conducted a review of research testing behavioural indicators of problem gambling and the potential utility of machine learning algorithms in this area. The review

identified a growing literature looking at monetary markers (e.g., net loss, average bet size) as well as non-monetary markers (e.g., session length, days gambled). Each of the markers could be tracked for patterns of increased or decreased behaviours over time. The review also found machine learning and data mining techniques were being used to learn about predictors of gambling behaviours. For example, multiple studies used these techniques to predict those who closed their betting accounts and also to predict who would subsequently request their account to be reopened. Deng et al. (2019) also found that although aggregate data had been the focus of most data mining studies, there was now a move towards bet by bet observations in real time. Through the development of sophisticated algorithms, researchers (or operators) could identify when a player has lost control or has changed their normal pattern of behaviour. The authors conclude that these advancements in data science have great potential for refining interventions and tailoring messaging to gamblers – both from the gambling industry, as well as those working to prevent and minimise harm.

## 4.5 Prevalence of gambling and problem gambling

Prevalence studies aim to determine gambling participation and the rate of problem gambling. These studies are an important source of information for government and policymakers and have been regularly undertaken in Australia and most countries with regulated gambling since the 1980s (Volberg & Abbott, 1994). The main focus of prevalence studies has been attitudes towards gambling and rates of participation and problem gambling. Over recent years, this focus has expanded to include gambling related harm as well as attention to new forms of gambling (e.g., internet-enabled gambling). Systematic reviews in the past five years indicate the international prevalence of past year problem gambling ranges from 0.2-5.8% (Calado & Griffiths, 2016) and amongst adolescents this estimate is even higher (0.2-12.3%) (Calado, Alexandre, & Griffiths, 2017).

The current review identified prevalence studies that were representative of the population from which they were drawn (i.e., stratified to represent the population) or a cross-sectional approach where the whole population of interest were invited to participate (e.g., firefighters in Melbourne). To be included in the current study, the data needed to be collected in the past five years and a valid screening tool for problem gambling administered. Prevalence of new forms of gambling was also assessed.

### 4.5.1 Evidence sources

Between October 2018 and April 2020, there were two systematic reviews (gambling amongst prison populations and college students) and 19 studies examining the prevalence of gambling and problem gambling. Of these studies, five originated in Australia, including NSW, ACT, SA (2), VIC. The focus of the studies included (i) participation rates for gambling, (ii) rates of at-risk and problem gambling, (iii) vulnerable populations, and (iv) new forms of gambling. The quality of the included studies was high, with all studies using representative sampling. There are no current studies funded specifically for prevalence but there is one GRA funded study re-examining the 2014 interactive gambling study.

### 4.5.2 Participation in gambling (adults)

There were seven studies examining gambling participation in population representative adult samples. Four reports were from Australia (NSW, ACT, VIC, SA) (Browne et al., 2019b; Paterson, Leslie, & Taylor, 2019c; Rockloff et al., 2020; Woods, Sproston, Brook, Delfabbro, & O'Neil, 2018) and three were international (New Zealand, Serbia, Isle of Mann) (Palmer du Preez et al., 2019; Terzic-Supic et al., 2019; Wildman & Eward, 2019). Overall Australian participation rates ranged from 53% (NSW) to 69% (Victoria). As expected, the main type of gambling over the past 12 months was lotteries (37-48% of the population). The second most frequent type of gambling was either EGMs and racing (14-20%) or wagering (12-20%). Participation in casino gambling was very similar across the four Australian studies (5-6%) as well as sports betting (6-10%). In NSW, the number of people playing EGMs had significantly decreased from a high of 31% in 2006, to 27% in 2011, to 16% in 2019.

The gambling participation rate reported in the three international studies ranged from 60 to 80%. Consistent with Australian studies, the most frequent type of gambling participation was lotteries (47-91%). Rates of EGM gambling ranged from 7 to 14% and wagering 7 to 12%. Compared with Australian samples, sports betting was more prominent in New Zealand (15.6%) and Serbia (28.7%). Participation in casino gambling also varied from 3 to 9%.

### 4.5.3 Rates of at risk and problem gambling (adults)

Of the four Australian studies involving adult samples, the rate of non-problem gambling ranged from 44% (NSW) to 59% (VIC). These results indicate the proportion of those who gamble who report no level of risk. The rate of low-risk gambling ranged from 4.6% (SA) to approximately 7% for all other

jurisdictions. The prevalence of moderate risk gambling was similar (all between 2.2 and 2.8%) as well as problem gambling (0.7-1%). Broadly, rates of gambling problems have remained similar to previous studies. The rate of problem gambling for the three international studies was similar for low-risk gambling (4.9-7.0%), moderate risk (1.5-1.7%) and problem gambling (0.5-0.7%).

#### 4.5.4 *Problem gambling in vulnerable populations*

Twelve studies examined the prevalence of gambling participation and problem gambling in vulnerable populations. These populations included students (four studies), youth (three studies) as well as employment (three studies), economic recession (one study) and older people (one study). Of these studies examining vulnerable populations, one was conducted in Australia (fire-fighters) and 11 internationally (four from USA, four from Europe, two from UK, one from Canada).

The only Australian study was by Cowlshaw et al. (2020) who conducted a large cross-sectional survey involving the entire SA Metropolitan Fire Service. This study identified an overall gambling participation rate of 12.5%. Using the PGSI cut-off at 1-4, 10% of participants were classified as low-moderate risk and a further 2.3% as problem gamblers ( $\geq 5$  PGSI).

Four studies focused on problem gambling rates in student populations (three in USA, one in Finland). One study was a meta-analysis of college student gambling and reported an overall rate of 8.9% (Nowak, 2018). The remaining studies combined their rates of gambling problems into one category (incorporating all levels of risk) (Grant, Lust, Christenson, Redden, & Chamberlain, 2019; Latvala, Alho, Raisamo, & Salonen, 2019; Richard et al., 2019a). This ranged from 4.5% (USA sample of athletes) to 24.5% (Finland).

Three international studies examined the prevalence of youth problem gambling. The overall combined rate of at-risk and problem gambling ranged from 3.6% (Europe) to 3.9% (UK) (Andrie et al., 2019; Commission, 2018).

Three studies examined the prevalence of problem gambling according to profession. These studies reported elevated rates of problem gambling for military personnel (7.7% problem gambling) (Gallaway et al., 2019) and stock market investors (4.4%) (Cox et al., 2020). Interestingly, the stock market investor groups reported very high rates of low-risk gambling (38.6%) despite a relatively low overall participation rate (10%). A Canadian study examined rates of problem gambling in older people (classed as 55+ years) (van der Maas et al., 2018). This study reported 1.8% at moderate risk or problem gamblers.

One systematic review examined the prevalence of problem gambling among incarcerated people in UK, USA, New Zealand, Canada and Australia (Banks et al., 2019). The study identified 12 studies ( $n=3892$ ) and reported between 5.9 and 73% of offenders met the criteria for problem gambling. Prevalence estimates differed according to gender with male offenders ranging from 10.4% to 73% and in females from 5.9% to 45%.

One study examined gambling participation and problems during recession (Economou et al., 2019). This study located in Greece reported an overall gambling participation rate of 41% and high rates of low-risk (7.4%), moderate-risk (5.5%), and problem gambling (2.4%). The authors concluded that having started gambling during the recession increased the odds of suffering from problem gambling; however, this finding was specific only to male gamblers.

#### 4.5.5 *New forms of gambling*

Two international studies examined the prevalence of online gambling. One study in Spain reported a participation rate in online gambling as 7.9% and the associated rate of problem gambling as 0.7% (Chóliz, Marcos, & Lázaro-Mateo, 2019). Another study in Poland reported a participation rate of



4.1% and associated at-risk and problem gambling rate of 27% (Lelonek-Kuleta, Bartczuk, Wiechetek, Chwaszcz, & Niewiadomska, 2020).

Across each of the included Australian studies, participation rates for online gambling were assessed. In NSW, just under one in ten (8%) adults gambled online over the last year (Browne et al., 2019b). This represents 15% of NSW gamblers. In Victoria, there has been a considerable increase in wagering and sports betting online over the past 10 years (current participation rate 27.6%) (Rockloff et al., 2020). This number is reduced to 13.6% when lottery products are removed. In South Australia, 13% of the population gambled online. In 2018, the gambling-related activities that were the most likely to have taken place online were fantasy sports (76% of players had bet online), sporting events (75% had bet online) and novelty events (61% had bet online) (Woods et al., 2018). This represents an eight-percentage point increase on the 2012 prevalence of online gambling in SA (5%) and a 12-percentage point increase on the 2005 prevalence (1%). Gamblers who would bet on an activity online typically bet more frequently than those who did not bet online. In the ACT, approximately 21% of adults (68,000 people) gambled online in the past 12 months. This accounts for approximately one-third of gamblers (35%) (Paterson et al., 2019c).

The association between internet gambling and problem gambling is mixed. In NSW, prevalence estimates suggest that moderate-risk and problem gamblers (31%) and low-risk (27%) gamblers were more likely to report having spent money gambling online than non-problem gamblers (16%) (Browne et al., 2019b). In South Australia, those who had gambled on the internet during the past 12 months were much more likely to be classified as at-risk gamblers (9.6%) than non-internet gamblers (3.2%) (Woods et al., 2018). In Victoria, problem gamblers were significantly more likely than non-problem gamblers to use the internet for gambling on sports, racing, pokies, eSports, fantasy sports, casino games or 'other' (novelty) activities (30.3% and 11.3%, respectively) (Rockloff et al., 2020). Moderate risk and problem gamblers were significantly more likely than non-problem gamblers to have gambled over the internet. Over four in ten problem gamblers (44.9%), moderate risk gamblers (43.9%), and low-risk gamblers (42.1%) gambled online, compared with a quarter (25.1%) of non-problem gamblers.

In the ACT, the analysis of online gambling compared with traditional land-based gambling suggests that gambling exclusively online does not appear to be a predictor of frequent, problematic or harmful gambling (Paterson et al., 2019c). The analysis of gambling mode preference in terms of mostly online and mostly offline gambling shows statistically significant associations between a preference for gambling mostly online and higher frequencies of gambling, increased at-risk and problem gambling, and increased self-reported gambling harm using the Short Harms scale. People who gambled mostly online reported one or more harms from gambling at double the rate of people who gambled mostly offline.

## 4.6 Understanding and measurement of harm

The conceptualisation and measurement of gambling harm is a rapidly emerging area in gambling research, treatment and policy. Gambling harm refers to direct or indirect negative consequences of gambling that are experienced by the gambler, their family or the community (Langham et al., 2016). While the concept of gambling harm has been recognised as an important part of clinical diagnosis for some 25 years (Delfabbro & King, 2020), recently the focus on harm has been vastly expanded to include a more broad-based definition such as the inclusion of those with low or moderate levels of harm. The current review identified research that specifically examined the conceptualisation of harm including its measurement. To be included in this study, the work needed to be empirical (i.e., include data or systematic analysis).

### 4.6.1 Evidence sources

In total, the review identified seven studies that have examined harm and harm measurement between October 2018 and April 2020. The quality of the included studies was low with one conceptual study (report), one critique and five exploratory cross-sectional surveys (no methodology such as Delphi applied – rather the consensus of a select group of interested researchers). Of these studies, five originated in Australia and two from Canada.

The focus of the studies included (i) one study representing a (limited) international consensus on a framework for conceptualising harm and two critiques of current conceptualisations of harm and (ii) four studies examining measurement issues.

### 4.6.2 Conceptualisation of harm

There were three studies which focused on the conceptualisation of harm. Abbott et al. (2018) report provided an update to the conceptual framework for gambling related harm (third edition). The aim of the work was to develop a comprehensive framework that accounts for the broad range of factors related to gambling harm at a population, community and individual level. The report objectives included a summary of the literature related to harm, to provide information to guide policy, treatment and regulation and to guide the development of future research programs. The framework represents major topics relating to gambling that range from specific (gambling environment, exposure, types, and resources) to general (cultural, social, psychological, and biological). The work is grounded in the conceptual framework of gambling harm (Langham et al., 2016). As indicated below, this model plots seven dimensions of harm against legacy, crisis and general harms.

In this third edition of the conceptual framework of harmful gambling, there is new information about the Taxonomy of Gambling Harms, the convergence of gambling and gaming, and social and economic impacts. Other areas have been expanded to reflect emerging areas of interest; including treatment interventions, comorbidities, gender, Indigenous groups, judgment, and decision making. Topics specifically related to harm include responsible gambling and the Reno model, social and economic impacts and a discussion on low-risk limits.

Abbott et al. (2018) also recommended further research into gambling specific topics such as the expansion of gambling through technology, exposure to gambling and impacts on at-risk groups (e.g., youth, culturally diverse, older people, prison populations and mental health issues). There was also a call for evidence-based education and prevention as well as research that explored treatment access and availability and consumer involvement (e.g., grassroots advocacy).

A related study by Baxter, Hilbrecht, and Wheaton (2019) applied the conceptual framework (described above) to research outputs in Canada, Australia and NZ. The aim was to determine the proportion of studies that aligned with the framework over a 10-year period (2008-2017). This study reported a greater percentage of Australian and NZ publications addressed the gambling environment (e.g., regulation) and exposure to gambling (e.g., advertising) than Canada. NSW research output over

these 10 years indicated more than 75% was not related to minimising gambling harm. The majority of research in NSW was psychological (e.g., correlates of gambling) followed by gambling exposure (e.g., advertising) and gambling environments (e.g., regulation). The smallest proportion of research outputs were related to gambling treatment and resources, biological factors, culture and gambling types. These findings were similar to Canada, where psychological factors made up almost 40% of research outputs. In contrast, New Zealand research outputs most frequently focused on gambling treatment and resources (almost 25%) followed by psychological factors (18%). The study concluded that regulatory factors inherent in the Australian setting (i.e., private versus public ownership of gambling) fostered a focus on operators' responsibility and individual responsibility, whereas jurisdictions such as in NZ with a stronger focus on public health, research focused on treatment and harm reduction resources.

Delfabbro and King (2019a) review of the conceptualisation and understanding of harm in Australia highlighted the strengths and weaknesses of this literature. Their review asserts there has been strong progress in terms of understanding the broad typography of harm associated with different levels of problem gambling. They also note multiple shortcomings in the literature, including very little information on the differentiation of harm between levels of gambling risk, especially amongst low-risk gambling. The authors suggest the lack of attention to different levels of harm make it difficult for policymakers to determine the best approach to respond to harm through regulation. The authors also call for different types of methodology for investigating harm. In particular, they call for the development of reliable and valid measures that can be used in prevalence research that capture gambling-related harm and shift research beyond a sole focus on single prevalence figures. Instead, there should be a move towards longitudinal studies examining a range of different harm measures.

#### 4.6.3 *Measurement issues*

Three studies examined issues associated with the measurement of harm. Rockloff, Browne, Russell, Merkouris, and Dowling (2019) examined harm using a cost-benefit analysis with the 2017 Tasmanian prevalence survey. Participants were asked three questions on the net benefit/harm of gambling. These were whether gambling made your life better or worse as well as the degree of better/worse. Where respondents indicated better/worse, they were then asked how much better or worse gambling has made your life. Overall, there was a net change in quality of life between +0.5% and -1.9% per capita. The authors suggest future studies should explore the benefit/harm across different gambling products and jurisdictions as well as the impact of individual characteristics on benefit/harm. Another Australian study using population-level data by Moayeri (2019) investigated the impact of gambling on quality of life using a secondary analysis of HILDA data (n=17606). They also reported significant decreases in quality of life and that this worsens with levels of problem gambling severity.

Angus, Anjoul, Shannon, and Blaszczynski (2019) examined harm reported in a community and treatment sample. To do this, the researchers administered the PGSI and a Harm Questionnaire (Shannon, Anjoul, and Blaszczynski (2017): reported in the 2018 research update). Overall, results were as expected, some harm was experienced across all categories on the PGSI and the severity of harm increased with the severity of gambling problems. However, there was a difference in the amount of harm between community and treatment-seeking samples, despite scoring similarly on the PGSI. This finding suggests focusing only on harm for non-treatment seekers may be unhelpful. In addition, around one-fifth of the community sample who did not meet the cut-off for gambling problems reported some harm. The authors suggested exclusively using the PGSI as a proxy for harm may result in incorrect estimates of the number of gamblers experiencing harm.

In an effort to separate harm from psychological dependence to gambling, Browne and Rockloff (2019) developed an 8-item behavioural dependence (BD) scale. The scale consisted of items from existing measures such as the PGSI and DSM-5 and included mood, tolerance, lying, chasing, escape and difficulty stopping gambling. The measure demonstrated to have good psychometric properties and when combined with a harm scale appeared to be a good predictor of personal wellbeing.

## 4.8 Policy and regulation

Policy and regulation in Australia refer to the rules that guide the participation and provision of gambling products. Almost all gambling participation in Australia occurs within state or federal legislation making this research questions especially political (Productivity Commission, 2010). Historically, approaches to policy and regulation in Australia have been informed by ‘responsible gambling’ frameworks such as the Reno model (Ladouceur et al., 2017). This model proposed shared responsibility between the provider, regulator and consumer of products. Over the past 5-10 years, there has been a move in most jurisdictions in Australasia to engage with a Public Health framework (Delfabbro & King, 2012). This framework targets whole of populations and aims to address supply, demand and harm reduction.

This review examined the current Australian literature for policy and regulation except where there were relevant international systematic reviews. Where possible, we restricted our search to empirical studies or those that applied an established framework or analysis. This approach was not always possible as there were very few studies that would be included. As such, we extended the inclusion criteria to include non-systematic reviews (e.g., Livingstone, 2018) and expert opinions on regulatory priorities. Policy and regulation research questions associated with prevention and treatment were informed by empirical evidence. As such, these areas were presented in the relevant sections and not in policy and regulation. The review will however draw together these areas in the final section.

### 4.8.1 Evidence sources

Between October 2018 and April 2020, there were 20 studies related to the treatment of policy and regulation. These included one meta-analysis, one systematic review and three non-systematic reviews. It also included three cross sectional comparison, 9 exploratory or cross-sectional surveys, two qualitative and one expert opinion. The overall quality of included studies was rated as low (87% of included studies).

All studies were from Australia except for the two systematic reviews and the one conceptual study that was relevant to the current review. Key areas of research over the past 18 months included (i) public health, (ii) advertising, (iii) regulation.

### 4.8.2 Public health approach

Six studies examined a public health approach for gambling. Rehm et al. (2019) systematic review examined the relationships between product addictiveness and regulation. They conducted a systematic search for reviews and meta-analyses of regulatory policies for the different substance categories and for gambling, and on the role of potency in regulatory policies. The authors stated that the potency can be defined as the potential for average losses per minute. This measure of potency was deemed equivalent to the concentration of ethanol, nicotine and THC respectively for alcohol, smoking and cannabis. Impacts on potency include the timing parameters (speed of play, event frequency) and amount of reward (e.g., size of top prize). Compared with alcohol which has policies and taxation based on the potency of the product, gambling regulation does not directly appear to be based on the degree of potency. This is a concern given there are different subcategories of potency (e.g., casino gambling without EGM through to venues where gambling is predominantly high potency EGMs). The review also presents evidence justifying different regulations for different subcategories of gambling based on overall harm (e.g., EGM structural characteristics are strongly and consistently associated with harm). Rehm et al. (2019) also notes that the evidence on harm to others in the alcohol field indicates considerable harm (e.g., traffic injury, violence) due in part to patterns of drinking. However, research within gambling appears to indicate that the impact is mainly on families and immediate environments. The authors state that current regulatory policies for gambling are often not in line with currently available evidence of harm.

Rossow (2019) examined the association between total consumption of gambling and problem gambling. They sought to determine the applicability of the Total Consumption Model (TCM) to gambling research. The model purports that total consumption is related to the rate of harm and that reducing the overall participation will have a reduction in total harm. Examining evidence from 12 empirical studies, Rossow (2019) reported all but one study supported the TCM, whereby there was a positive association between the rate of gambling and problem gambling. The author suggests that interventions that are successful in reducing overall gambling rates are also likely to reduce problem gambling rates.

David, Thomas, Randle, and Daube (2019) conducted a narrative review of theories of change and public health advocacy. They applied a change management model which identified eight key areas that can inform change to public health and gambling in Australia which included creating and communicating a vision, empowering others to act and creating short term wins and long-term goals to reinforce the vision. The authors state that this approach may be helpful because a clear public health advocacy approach to gambling harm prevention and reduction has not been well established.

Shaffer, Blaszczynski, and Ladouceur (2019) provided a commentary on the association between public health and the Reno model. The authors suggest four principles characterise a public health perspective and that these are shared by the Reno model. The Reno model focuses on shared responsibility for 'responsible gambling' with a focus on attempting to prevent the incidence and prevalence, and minimisation of harm. There is currently a debate in the literature that expands on the Reno model (see responses to Shaffer et al. (2019)). At best, the model appears to capture the harm reduction arm of the Public health model but excludes examination of supply and demand.

Livingstone et al. (2019) sought to identify effective policy interventions to prevent gambling harm. This report produced for VRGF represented a non-systematic review of the gambling literature. It covers structural characteristics of gambling products, pre-commitment and self-exclusion, pop-up messaging, access and exposure, in-venue identification of people with problem gambling, advertising and marketing, stigma reduction, price, framing of gambling, context, product information, industry structure, regulation and industry influence. Rintoul (2019) examined the views of experts internationally in terms of improved public health policy and regulation of gambling. This report indicated that key measures internationally were registered gambling (e.g., pre-commitment), improved monitoring of industry practices, and excluding the influence of the gambling industry from policy development and research.

#### 4.8.3 Advertising

Bouguettaya et al. (2020) systematic review and meta-analysis of 27 studies examined the association between gambling advertising and attitudes, intentions and behaviours. Bouguettaya et al. (2020) reported some evidence for a dose-response association between advertising and attitudes that they suggested was similar to that observed for alcohol marketing. Meta-analysis was limited to just two studies but suggested a medium overall effect. This study also examined the association between advertising and behaviour and reported a small but significant relationship, and the direction of effect was found in all but one included study. The majority of studies reviewed reported a positive association between advertising and gambling intentions. Just five studies contained sufficient data for meta-analysis, which again indicated a small but significant association. Overall, the review reported a significant link between advertising, attitudes, behaviour and intentions. However, the quality and breadth of research in gambling advertising was weaker than in other addiction areas such as smoking or alcohol because of the absence of longitudinal and experimental studies.

Seven Australian studies examined advertising and the promotion of gambling. Three of these studies were from the same group (CQU) using similar methodology. Browne, Hing, Russell, Thomas, and Jenkinson (2019a) examined the impact of exposure to wagering advertisements and inducements on intended and actual betting expenditure. This study recruited 722 participants and administered real-time monitoring via smartphone (using ecological momentary assessment) to track exposure to

advertising and intention to gamble. This study reported that advertising and inducement exposure was linked to a greater chance of betting, higher intended and actual betting expenditure, and spending more than intended. Browne et al. (2019a) also reported inducements pushed to punters were associated with increased gambling activity as well as marketing during events.

In another study by the same research group, Rawat, Hing, and Russell (2019) examined the content of 931 emails and texts received from wagering operators in Australia during sports and racing events. Rawat et al. (2019) reported the most common type of message was inducements which offered bonus bets, rewards points, better odds/winnings, and reduced risk. Frequently promoted inducements included bonus or better winnings, refund/stake back offers, and match your stake/deposit. Hing, Russell, Thomas, and Jenkinson (2019b) examined exposure to wagering advertisements and inducements with 722 regular racing and sports bettors. Hing et al. (2019b) reported regular gamblers have almost daily exposure to advertising and inducements. Similar to Rawat et al. (2019), the most influential inducements were stake-back offers, multi-bet offers, match your stake or deposit offers, better odds/winnings inducements, happy hours, rewards programs, and cash out early offers. For some people across all levels of gambling risk, there was an increase in the size and frequency of expenditure. As demonstrated in Lole et al. (2020) cross-sectional study involving 59 gamblers, these advertisements may trigger arousal, especially in people with problems.

Three Australian studies examined the impact of advertising and promotion on youth gambling. Parnell, Edmunds, Pierce, and Stoneham (2019) examined the volume and type of advertising around schools in Perth, Western Australia (WA). Across 29 local government areas, 20% of 'unhealthy' advertising related to gambling which was almost double the amount of alcohol (12%). Two further Australian studies examined young people's recall and awareness of advertising. Nyemcsok et al. (2018) recruited 111 people aged 11-16 years of age from Victoria and reported a high recall of gambling advertising. In this study, 81% of young people recalled at least one betting brand with a further 23% intending to gamble at 18 years of age. In a second study with the same sample, Thomas et al. (2018) reported the majority of young people recalled seeing gambling advertising on television (91%) with most recalling advertising presented during sporting matches (71%). The majority stated that they continued to watch sport after 8:30 pm (84%), which is when restrictions on advertising in live sport in Australia end.

#### 4.8.4 *Regulation issues*

Five studies examined regulation issues with three focused on EGMs, one offshore gambling and one consumer wagering. Two studies evaluated EGM data in relation to policy change and distribution. Stevens and Livingstone (2019) evaluated two changes in EGM policy on user losses in gaming venues in the Northern Territory (NT). They reported that from 2010 (post smoking ban) to 2013, losses were stagnant, but from 2013 to 2017, real user losses in community venues increased, with increases higher for larger clubs and hotels. Over the same period, user losses in the two casinos declined by 13%. Between 2005 and 2015, estimated user losses per EGM low/moderate risk and problem gambler increased by 5 and 34% respectively.

In another NT study, Paterson et al. (2019b) reviewed the NT code of practice for responsible gambling by recruiting gambling venue staff. The report examined the implantation of the Code of practice which stipulates 10 different categories that operators must implement and comply with as part of the licensee conditions. Paterson et al. (2019a) study involved venue observations, a survey of gambling venue staff, in-depth interviews with venue staff, in-depth interviews with NT Government compliance officers and a public submission process. Overall, the review revealed a significant level of venue noncompliance with the Code (e.g., limited information on self-exclusion or access to exclusion forms). The authors point to a lack of adequate enforcement of the Code, as well as significant issues with training and implementation.

Livingstone (2018) provided consultation to the ACT government in the form of a plan for preventing and minimising harm from EGMs. The study suggested 42 key areas for reform to venues including limitations to the venue size, operating hours, bet limits, removal of linked jackpots, game

characteristics, accurate information (e.g., price), taxation and re-allocation of revenue and transparency of community benefit schemes. In addition, Livingstone (2018) made recommendations related to loyalty programs, treatment and prevention measures.

Gainsbury, Abarbanel, and Blaszczyński (2019) examined factors associated with internet gamblers use of offshore gambling sites. They surveyed 1001 Australian past month gamblers and reported offshore gamblers (53%) were a distinct demographic cohort and were more highly involved in online gambling. Across all online gamblers, there was limited concern that sites had variable regulation. Instead, participants reported choosing sites based on ease of use, and cues that they were designed for gamblers in the advertised jurisdiction. The authors suggest the use of offshore sites may be discouraged by focusing on the benefits of domestic sites and ensuring that these can provide a good consumer experience.

Jenkinson, Khokhar, Rukhsana, Jatkar, and Deblaquiere (2019) developed a consumer protection framework for online wagering through a desktop review of Australian online wagering regulations, interviews with service providers and regulators and a survey of 5076 people who wager online. This report on stakeholder consultations indicated that regulators were generally very supportive of the Framework, describing it as a positive development in encouraging stronger consumer protection measures and promoting the regulation of online wagering in Australia. The 10 agreed measures to reduce gambling-related harm include:

- Prohibit lines of gambling credit by online wagering providers.
- Discourage payday lending for online wagering.
- Restrict a range of inducements across jurisdictions.
- Ensure closing an online wagering account is easy for all customers.
- Provide voluntary opt-out pre-commitment tools.
- Ensure customers receive meaningful wagering activity statements.
- Provide evidence-based consistent gambling messaging.
- Provide certain staff training in responsible service of online gambling.
- Provide a national self-exclusion register for online wagering.

The authors stated that the National Framework has been developed on the best available evidence and was consulted on widely with key stakeholders. Although it provides a strong benchmark, it will need to be evaluated and updated over time in line with best practice.

## 5 Discussion and implications

The purpose of this rapid review was to update the 2018 gap analysis addressing seven research questions. The research focused on the best available evidence in terms of identifying all reviews that were conducted systematically as well as Australian research conducted between October 2018 and 23 April 2020. We also included relevant international research so as to be able to draw comparisons with and insights for the Australian context. The review covered academic and grey literature with each included study assessed for quality.

The review specifically addressed the area of harm prevention, minimisation, intervention and support. To identify gaps in the priority areas, this section provides a specific discussion against each of research questions. It describes patterns in the identified studies including the direction of findings and generalisability and relevance to the seven research questions. A brief limitations section and implications for further research are also provided.

### 5.1 Summary of findings by research questions

A total of 215 documents, comprising 198 peer-reviewed articles and 17 grey literature reports were identified between October 2018 and 23 April 2020. There were 26 systematic reviews and the majority of included literature was research using exploratory or cross-sectional design (49%), RCT design (14%) or pre-post cross-sectional comparisons (12%). As would be expected given the focus of the analysis, Australian research comprised a large proportion of the literature with 30% of included studies being Australian. Analysis indicated the quality of evidence of included studies varied with treatment characterised as higher quality of evidence because of a greater proportion of RCT's than any other research questions. Seven studies addressed other vulnerable groups. Five cross-sectional studies examined other themes around vulnerable populations including family violence (Dowling et al., 2019; Roberts et al., 2020b), comorbidity (Kim et al., 2018; Kotter, Kräplin, Pittig, & Bühringer, 2019), and homelessness (Machart et al., 2020). A consistent theme across each of these studies was the association between family violence, comorbidity and homelessness and increased rates of gambling problems. Two of these were studies investigating interpersonal violence (Australia and UK), and both concluded that around one-quarter of gamblers in treatment were either the victim or perpetrator of family violence (Dowling et al., 2019; Roberts et al., 2020b). Dowling et al. (2018b) found that screening for interpersonal violence was important when working with gamblers as was addressing psychological distress, symptoms of PTSD, alcohol use and impulsivity that may contribute to interpersonal violence.

Two studies examined problem gambling and offenders including one systematic review (Banks, Waters, Andersson, & Olive, 2019) and one study examining the prevalence of gambling problems in Finnish prisons (Lind, Salonen, Jarvinen-Tassopoulos, Alho, & Castren, 2019). Banks et al. (2019) systematic review focused on the prevalence of problem gambling in offenders. The review identified 12 studies involving 3892 participants from Australia, Canada, New Zealand, the UK and USA. They found between 6% and 73% of inmates met diagnostic criteria for problem or pathological gambling across. The authors concluded that interventions across each stage of the criminal justice system may be needed. we identified 13 research studies that was currently supported by the Responsible Gambling Fund in 2019 and 2020.

The overall low quality of studies conducted over the past 18 months is cause for concern. The most frequent study design was cross-sectional with just one in four studies including any kind of comparison group. The majority of studies that did employ a comparison group were treatment (not prevention or harm minimisation) and where a comparison was employed frequently there was no difference in outcomes between the treatment and control. A large number of these studies did not report effect sizes and instead relied on the p-value. The result is statistically significant effects that are



difficult to interpret. Indeed, one issue that the field needs to grapple with is the very small effects particularly in the responsible gambling realm. In addition to this issue is the lack of replication studies. For many key priority areas conclusions are drawn on one or two studies. This approach is potentially limited given many studies involve small sample sizes or are not generalisable due to the selected methodology (e.g., qualitative research).

The themes identified in this report are somewhat consistent with previous findings. As outlined below, many of the key findings continue to be prominent in the literature.

### *5.1.1 Prevention and harm minimisation implications*

The direction of findings varied across topics. A summary of each study (including aim, method, outcomes and conclusion) in this section is provided in Appendix 7. There appeared good evidence internationally for school-based programs and overall there were positive attitudes towards responsible gambling measures. In addition, the growing body of research on limit setting is showing promise for theoretically informed options such as PNF. There were mixed findings on when and how to provide prevention to adults through education. The findings for host responsibility, staff training, and self-exclusion indicated consistently negative outcomes and systematic problems in terms of program processes and impact on reducing gambling harm. An emerging area indicated almost all gamblers attempt to self-limit their own gambling through cognitive and behavioural strategies. Historically referred to as “natural recovery” it is now acknowledged that gamblers engage with a whole range of self-help strategies to limit or reduce their gambling.

The generalisability and relevance to prevention and harm minimisation was variable. Although topics such as schools’ education included high quality studies, there were none with Australian participants. Topics that were highly generalizable due to the quality of evidence and inclusion of Australian participants were host responsibility and staff training, attitudes to responsible gambling, self-management and self-exclusion.

The gaps and potential for future research are indicated in Table 16. This table shows a lack of empirical studies for prevention (schools and education). It also indicates a lack of outcome-based studies for most of the identified topics. The gap analysis highlights the need to move forward with available evidence and beyond cross-sectional surveys. There are now many areas where research is clear on the direction of findings (e.g., ways to support limit setting in gambling venues) and these topics urgently need to be tested against a control condition. Without this empirical testing it is not possible to know whether these interventions actually work to reduce gambling harm.

The Responsible Gambling Fund current research projects are responding in part to these gaps. For instance, the CQU RCT on safe gambling guidelines is an important response to these identified gaps.

### *5.1.2 Treatment and engagement implications*

The overall direction of findings was consistent across studies. These indicated that treatment appears to reduce gambling symptoms in the short term. However, when treatment was compared against assessment only or another intervention, there was minimal difference between the conditions at short- or medium-term follow-up evaluation. A summary of each study (including aim, method, outcomes and conclusion) in this section is provided in Appendix 8. There are many promising treatments identified and these continue to build on many years of treatment research. However, there was a consistent lack of medium- or long-term follow-up evaluations which limit our knowledge of whether these treatments actually work. Promising new treatments include pharmacotherapy and mindfulness which have both shown good short-term impacts on gambling problems. Also reported consistently is that interventions for family members do not make a difference over and above a control condition.

The generalisability and relevance to treatment was variable. Most of the available evidence was of moderate to high quality because of the number of RCT's but very few studies were conducted in Australia. Compared with the 2018 review which took a narrow look at treatment, the current review included information on help-seeking, new and novel treatments, and ways of improving access and attrition. These findings appear highly relevant to the question of effective treatments and should be subject to further evaluation.

The gaps and potential for future research for treatment and engagement are presented in Table 17. The gaps and future research for the most part involved developing effective treatments and conducting routine and meaningful follow-up evaluation. It is well established that co-morbidity is a huge problem for people with gambling problems, but the current review indicated that two iCBT treatments were not effective in reducing comorbid symptoms. Future research needs to understand how and when people with comorbid issues want and expect support or treatment. It should also investigate partnerships with mental health services and the development of effective transdiagnostic treatments. These treatments aim to address underlying issues such as impulsivity and cognitions which are thought to have an impact on multiple disorders at the same time. The availability of medium- and longer-term follow-up is hampered by multiple factors including attrition and treatment engagement. Future research should investigate methods of retaining clients in treatments for follow-up evaluation as well as to continue to support people over the longer term. It may be that all funded treatment studies must include longer term follow-up but that the conduct of the follow up is undertaken outside of the grant timeline.

Spontaneous or natural recovery from gambling problems was included under 'self-management' in the harm minimisation section (also referred to as self-help or behaviour change strategies). The location of this section as harm minimisation was due to the included studies not consistently specifying whether strategies were used by gamblers to stick to limits and minimise harm or as a means of recovering from a gambling problem. As noted, the reviewed literature indicates that gamblers across all levels of harm use cognitive and behavioural strategies, but the frequency of use and types of strategies may differ according to whether the person wants to limit harm or recover from harm. For instance, those aiming to limit harm tend to use more in-venue strategies than those who are attempting to recover from harm. Future research should further explore the effectiveness of these strategies for different gambling goals and readiness to change as well as those used to stick to limits when gambling.

The four Responsible Gambling Fund supported research projects are responding to these gaps with projects investigated blended face-to-face and online treatment and family treatment needs. The exploration of a chatbot virtual assistant for the Gambling Help website may significantly improve engagement and referral.

### *5.1.3 Vulnerable groups implications*

The overall direction of findings was that vulnerable groups have lower gambling participation but higher rates of gambling problems. A summary of each study (including aim, method, outcomes and conclusion) in this section is provided in Appendix 9. Young people, CALD and at-risk professions (e.g., emergency workers, finance industry) all consistently reported elevated risk of gambling problems. This result was also found in other vulnerable groups such as those susceptible to family violence and comorbidities.

The generalisability and relevance of these studies was variable. Most studies were low quality and cross-sectional surveys with representation from Australia. The relevance of included studies was high where vulnerable groups appeared to be particularly impacted by other research questions such as the effectiveness of prevention and treatment.

The gaps and potential for future research for vulnerable groups are indicated in Table 18. The gaps and future research opportunities were associated with gathering more information and the development of tailored prevention and intervention programs. More information is needed on

predictors of risk and protective factors for young people, CALD and Aboriginal populations, and at-risk professions. This required information includes understanding factors around resilience and peers, community and family. Given these specific vulnerabilities, effective interventions that are tailored to the needs of these vulnerable groups are urgently needed. This should involve a needs analysis and determination of what is needed or wanted by people in these vulnerable groups who are at risk. Ideally, interventions are subject to empirical testing and grounded in theoretical frameworks.

The four Responsible Gambling Fund supported research projects go some way to addressing these gaps. For instance, multiple studies further our understanding of how the changing landscape of gambling in childhood, adolescence and young adulthood impacts on young people and gambling. Where there is limited research involving CALD, this is being addressed to some extent by Western Sydney Community Forum who is conducting a study which aims to develop a practical framework for offering a culturally responsive approach to addressing problem gambling. The gap analysis identified a short coming in responding to comorbidities and this will in part be addressed by the study examining screening for gambling in comorbid populations in a hospital setting.

#### *5.1.4 Emerging technology implications*

There was a small amount of literature that mostly focused on the convergence of gaming and gambling, as well as new types of internet gambling and the use of player tracking data. A summary of each study (including aim, method, outcomes and conclusion) in this section is provided in Appendix 10. Across multiple studies, there were consistent findings that gaming and gambling were increasingly converging. Those who spent more money on in-game gambling (e.g., loot boxes) also more frequently reported gambling problems. Although these studies were all cross-sectional it does point to the need to consider the ramifications of this association in terms of regulation and policy. For instance, it appears that in-game gambling uses the same mechanisms as EGMs in terms of a variable ratio reinforcement schedule and the outcome being dependent on chance. This reinforcement schedule is most resistant to change and, therefore, likely to keep people gambling in games even if the price increases (at the moment the price per in-game gambling is low). The gaps and potential for future research within emerging technology are indicated in Table 19.

There was just one Australian study that examined social casino games (Rockloff, Browne et al., 2019). This study indicated some people who engage with social casino games may migrate to online casinos and may be at greater risk of developing a gambling problem. An issue with social casino games is that the outcomes are typically not based on the same reinforcement schedule as gambling games. Players win much more often. The problem becomes that some players may begin to think they are “good at the game” and migrate to gambling because they erroneously believe they have skill. It is also important to note that some newer research is showing that some disordered gamblers use social casino games to reduce their craving for gambling (Wohl, Salmon, Hollingshead, & Kim, 2017). As such, social casino games may have some utility for treatment and recovery.

The three Responsible Gambling Fund research projects are directly addressing some of these gaps. For instance, knowledge of the association between purchasing loot boxes and gambling will also be addressed with a study by CQU. In addition, the GRA funded re-examination of the 2014 interactive gambling study will provide new insight into how gambling participation and harm has changed due to technology

#### *5.1.5 Prevalence implications*

The results from the included literature was consistent in terms of gambling participation. A summary of each study (including aim, method, outcomes and conclusion) in this section is provided in Appendix 11. Across international and Australian studies, gambling participation remains largely stable with a small decrease in participation in EGM gambling. The rates of at-risk and problem gambling have remained largely unchanged. Around 10% of Australian adults report some level of gambling risk. Vulnerable populations such as youth, students and high stress professions such as emergency workers also consistently report lower rates of gambling than the general population but

higher rates of gambling problems. Participation in new forms of gambling, including sports betting, has increased across all jurisdictions.

The generalisability of these studies is high. All included studies used representative sampling, meaning the results are likely to reflect the population from which they were drawn. Four of the included studies were with Australian populations, further increasing their generalisability to the Australian setting. These prevalence findings have relevance to understanding multiple other Responsible Gambling Fund identified research questions; for instance, prevention and treatment. As the findings are that prevalence rates have not moved, a clear explanation as to why remains elusive. It may mean that prevention and harm minimisation efforts are working because the rate of problem gambling has not increased and/or it may mean that interventions are not effective.

These studies provide important information on gambling patterns, but more information is needed on the risk and protective factors of gambling and problem gambling over a longer period of time. It may be that there are opportunities to build gambling into other health and lifestyle annual surveys such as HILDA. Given the cost involved in high quality prevalence surveys, creative solutions are warranted. The gaps and potential for future research for prevalence are indicated in Table 20.

#### *5.1.6 Harm measurement implications*

The included literature on harm measurement was small and inconsistent. A summary of each study (including aim, method, outcomes and conclusion) in this section is provided in Appendix 12. There was disagreement in the literature on the definition, conceptualisation and measurement of harm. The overall quality of evidence was low, although most studies were based in Australia. The main gaps include achieving an international consensus (and Australian consensus lacking also) on the definition of gambling harm. This could be similar to the consensus on the use of the term problem gambling as inclusive of pathological gambling which was arrived at some 20 years ago. Psychometric testing of a range of tools is needed for different purposes (e.g., player tracking, treatment seekers, prevalence surveys).

The review noted that the PGSI was an inadequate measure for harm. This is not surprising given it was intended to measure the severity of gambling problems in the general population (Currie, Hodgins, & Casey, 2013; Holtgraves, 2009). Across this review the PGSI has been used in clinical settings even though it was developed for research involving general populations. Recent work has however examined the utility of the PGSI in clinical settings (Merkouris et al., 2020). This study reported a score of 19 or more may indicate a need for more intensive interventions (e.g., face-to-face treatment). A summary of findings, alongside the gaps and potential for future research for harm measurement are indicated in Table 21.

#### *5.1.7 Policy and regulation implications*

The included literature for policy and advertising was consistent across multiple studies. A summary of each study (including aim, method, outcomes and conclusion) in this section is provided in Appendix 13. Over the past two years a meta-analysis and seven cross-sectional studies have indicated a relationship between advertising and subsequent gambling. The quality of evidence is at a moderate level, however, taken together with research conducted outside of this timeframe, suggests there is evidence to support regulators look at this issue. Recently, Wohl (2018) noted the potential negative effects of loyalty programs given the incentives provided may reinforce gambling. Future research might consider the use of loyalty data and the subsequent tailoring of advertising.

Other topics were less cohesive as they were, for the most part, low quality using non-systematic review, survey and opinion research methodology. One of the highest quality studies conducted by a top international academic in addictions examined the potency (or addictiveness) of various products in order to make recommendations on regulation and taxation (Rehm et al., 2019). The study recommended that gambling be assessed on its average losses per minute which would include any fast-paced gambling such as EGMs. Other identified gaps in this review include consumer advocacy

and a high-quality assessment of current regulation effectiveness in Australia and internationally. A summary of findings, alongside the gaps and potential for future research for policy and regulation are indicated in Table 22.

#### *5.1.8 Study limitations and future direction for this review*

This study describes the findings of a rapid review conducted between October 2018 and April 2020. The review was undertaken over a six-week period from conceptualisation to delivery of the final report. The rapid review methodology is well suited to this need in that it can be completed with a systematic approach while at the same time being pragmatic in answering the stated research questions with the available resources.

We followed the rapid review methodology as outlined by (Khangura et al., 2012). However, as with all methodological approaches, the rapid review approach is not without limitations and these should be taken into consideration when reviewing the findings (Abrami et al., 2010). To achieve the review within the short timeframe, we restricted screening to single coders except for dual coding 20% of abstracts. We also restricted full text screening to single coders again with 20% dual coding. In both cases, the 20% double coding indicated high levels of coding consistency, supporting the single coder approach across the balance of the coding conducted. The search across the seven research questions was conducted concurrently which is not an optimal approach. Doing so, means that some research may have been missed because of the sheer volume of records that needed to be screened in a short timeframe. We also needed to identify articles that were published after October 2018, but most academic databases allow search parameters to be set by year (not month) which required further hand searching of all 2018 articles. The focus on Australian studies, and international work where relevant, meant that the database search could not initially be limited to Australian only.

The rapid review methodology combined with the inclusion of seven research questions meant that analysis was restricted to broad themes rather than detailed analysis. This outcome is consistent with the aims of the study but does mean further reviews are required to examine research questions in more detail. Future iterations of the review could consider whole year reviews (entire calendar year) which would perhaps align better with the Responsible Gambling Fund calendar. In addition, as knowledge continues to grow it may be beneficial to consider conducting an umbrella review where all systematic reviews that address gambling harm are gathered and analysed. These could then be supplemented with Australian research conducted during the assigned time period of the review.

Despite these limitations, the current review has provided a succinct summary of relevant literature across the seven distinct research questions, in line with the research plan for the Responsible Gambling Fund. The breadth of content addresses key priority areas and answers critical questions relevant to the Australian context. Our gaps analysis also incorporates recommendations for future research facilitating a smooth transition to the next wave of research to be undertaken. Importantly, areas that have sufficient evidence have also been identified allowing a focus to be drawn on translation, a critical step towards reducing the evidence-practice gap.

#### **Conclusion**

This rapid review provides a useful resource for the Responsible Gambling Fund in terms of informing the research plan and future research funding priorities. Through a rapid review methodology, it identified literature relevant to seven research questions. The identified literature was of variable quality but for the most part each research questions contained information relevant to the Responsible Gambling Fund.

Since the last review, we have identified that more evidence is now available for prevention and harm minimisation as well as treatment and predictors of treatment engagement. Across each of these research questions, interventions and approaches to prevention and harm minimisation are increasingly being delivered and evaluated online. There was a greater understanding of the current trends in

gambling participation and gambling problems as well as extensive evidence of associations between gambling advertising and unwanted gambling behaviours.

The available evidence for school-based education, responsible gambling staff training and technical solutions to support limit setting when gambling, suggests that these are now ready for more translation and empirical evaluation. The Responsible Gambling Fund supported research projects go a long way to addressing the current gaps in the literature and in meeting the RGF research agenda.

Research projects are also investigating blended face-to-face and online treatment and family treatment needs and the exploration of a chatbot virtual assistant for the Gambling Help website may significantly improve engagement and referral. Research on vulnerable groups has been lacking and the Responsible Gambling Fund supported research project investigating youth and gambling, CALD and comorbidities go some way to addressing some of these gaps. Knowledge of the association between the convergence of gaming and gambling is also being addressed.

However, we are still lacking evidence for medium- and longer-term impact of prevention, harm minimisation and treatment. In addition, there are research gaps in how to foster engagement with responsible gambling tools and also treatment beyond the initial registration or consult. There is promising evidence that pharmacotherapy may be effective for Gambling Disorder as well as other newer treatments such as mindfulness. Further work on understanding the alignment between barriers to treatment and the type and range of services provided could also be of value. Although there is some work with Aboriginal and CALD currently underway this continues to be a gap in terms of understanding risk and protective factors.

Australia is leading the field in areas of addressing gambling as a public health issue as well as a diagnosable mental health disorder (i.e., Gambling Disorder). There is a great deal of research occurring that is currently addressing important gaps and will go some way towards extending the evidence base beyond cross-sectional surveys. The available evidence suggests that in many areas there is significant advancement which can be further enhanced through addressing some of the current gaps in the literature.

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Table 18. Summary of research findings for prevention and harm minimisation

Topics	Direction of findings	Generalisability	Relevance to research question	Gap	Future research
Schools	Schools based programs indicated some promise for longer-duration programs with a reduction in the frequency of gambling. Regular inclusion in curriculum seems key. Focus should be risk and protective factors.	Moderate to high quality of evidence internationally plus large sample sizes.	Prevention is a focus but there are very few research areas that are true prevention. Schools based education is highly relevant to prevention.	There were no Australian empirical studies on schools-based education. There was no long-term follow-up evaluations in Australia.	Establish an evidence-based series of modules (ideally online) that is embedded in curriculum and is subject to routine evaluation.
Education	Focusing on house edge appears more helpful education than return to player. Delivering education immediately before gambling is better than during gambling.	Moderate quality of evidence but small samples. The one Australian study showed mixed results.	This is one of two topics that are specific to prevention and it is under-studied.	There was just one Australian empirical study on the impact of adult education for prevention.	Establish evidence based effective education programs that are instructional to adult gamblers. Ideally these are similar to schools programs but targeted at adults.
Host responsibility and staff training	Perceptions of responsibility for minimizing harm was mixed where role conflict was a consistent theme. Current staff training and implementation had limited impact on gambling harm	Moderate quality with host responsibility mainly qualitative and staff training quantitative data. Four large-scale Australian studies.	Host responsibility is at the core of RG and currently Australian studies indicate role conflict and a reluctance to implement training.	There is dissatisfaction and confusion as to roles in implementing RG in Australia and internationally.	Review RG guidelines based on available evidence. Conduct mandatory annual evaluation which measures impact.
Attitudes to RG	Neutral or positive attitudes to RG tools except for some PGs. Tailoring is needed to improve personal relevance.	Low to moderate involving surveys with large samples. Two studies in Australia.	Harm minimisation requires individuals to be willing to engage with resources. The evidence points to where this can be enhanced.	Attitudes are now well established with the next piece of work needed on how to translate this information.	Examine methods to address engagement with RG tools
Limit setting	Focus on guidelines, deposit limits, personalised normative feedback, in-venue support and predictors of adherence to limits. Positive outcomes associated with online warning systems with personalised feedback.	Moderate levels of evidence that is mostly international and online gambling. One RCT in Australian gambling venues aimed at supporting limit setting.	Core to harm minimisation in terms of setting financial betting limits and sticking to them.	Focus is on internet gambling with few studies in land-based gaming venues.	Trial evidence-based interventions in land based and online venues.
Self-management	Cognitive and behavioural strategies are used by all gamblers and increase with level of gambling risk.	Low level evidence characterised by cross-sectional surveys. Most studies are Australian.	Gamblers are active in their own recovery and can be supported to implement their own harm minimisation strategies (not just rely on RG)	Current focus on top-down harm minimisation has meant limited research on early intervention.	Trial the effectiveness of self-initiated strategies for sticking to limits and reducing gambling risk.
Self-exclusion	Mixed findings due to complexity of enrolment, lack of global system and poor detection methods.	High quality evidence including multiple reviews and RCT's. Just one Australian study.	An effective self-exclusion program can potentially have the greatest impact on gambling harm.	Global programs which are easily accessible online and cover all forms of legalised betting are being reported internationally but not in Australia.	Trial new technology to improve detection. National registry available online and for all forms of legalised gambling. Penalties are applied to venues for permitting breaches.

Table 19. Summary of research findings for treatment

Topics	Direction of findings	Generalisability	Relevance to research question	Gap	Future research
Effectiveness	Consistent reduction at follow-up for all participants but no difference between groups. Consistent with meta-analyses indicating short term improvement but mixed findings over the longer term.	High quality evidence with all RCT's of systematic reviews. Just one Australian study	Central to the research question.	Almost half of RCT's were post-treatment only with no long-term evaluation reported.	Medium- and long-term evaluation of treatment effectiveness.
Help-seeking	Gamblers are active in seeking help and use a range of different professional and non-professional treatment options.	Low to moderate quality evidence with one of two studies conducted in Australia.	The effectiveness of treatment relies on the provision of services that are deemed relevant and attractive.	There is no research on the effectiveness of the service systems in Australia which offer a vast array of largely untested interventions.	Examine the effectiveness of new or existing services and the extent to which these are wanted or needed by consumers.
CBT	Consistent reduction in gambling symptoms in the short term. Pre-post studies also reported reduced symptoms. Some indicator that focusing on money control can improve outcomes	Of the three studies only one was an RCT and this was conducted in Australia.	CBT is established as the treatment associated with the most evidence.	There is no research on short term or longer treatment outcomes. While CBT is demonstrated to be effective, knowledge on the active ingredients is less well known.	Understand which components of CBT contribute towards gamblers outcomes.
e-therapy and iCBT	e-therapy is attractive to clients and may reduce barriers to treatment. Of the iCBT studies none showed differential effectiveness across conditions. Interventions for alcohol and mental health were not effective.	Moderate quality with one Australian study examining clinician attitudes towards blended iCBT and e-therapy.	Access to treatment in Australia is a significant issue and e-therapy and iCBT may significantly improve rates of engagement.	There were no substantiated treatment options for co-occurring mental health and other addictions. Very few studies looked at longer term follow-up evaluation.	Test a range of modalities and service system options for addressing co-morbidity. Conduct medium and long-term evaluation of e-therapy.
Pharmaco-therapy	Naltrexone appears effective for reducing gambling symptoms at least in the short term.	Moderate quality with most studies involving small numbers of participants that were convenience samples.	Pharmacotherapy appears relevant to treatment effectiveness and appears to work better when delivered with psychotherapeutic interventions.	No Australian studies on pharmacotherapy. This is a concern given its promising findings for people with PG.	Conduct randomised trials on the effectiveness of naltrexone for PG.
Novel or new treatment	Promising new treatments include third wave CBT specifically mindfulness. A meta-analysis reported good outcomes for mindfulness at least over the short term.	Moderate quality with no Australian studies.	Engagement is a huge issue for treatment effectiveness, and it may be that third wave CBT's such as mindfulness are engaging to clients.	No Australian studies on third wave therapies.	Conduct RCT examining the effectiveness of mindfulness and other third wave treatments.
Families	Family member treatments are consistently not better than a control condition. One study reported gamblers want treatment to help the gambler and also to help themselves.	High quality with no Australian studies testing effectiveness.	Gamblers report family members can make a difference to their decision to seek treatment and stay in treatment which would impact on treatment effectiveness.	Limited effective treatments for family members that work better than a control condition. Most treatments are based on alcohol and drug studies.	Develop and test evidence-based treatments for family members that are relevant and appropriate for PG.
Improving access	Barriers to treatment are well known these are especially challenging for rural and remote Australians.	Low quality with one study originating from Australia.	Access is crucial to treatment and structural or systemic	Alignment between identified barriers and the service system response is not well known.	Identify gaps in the service system in terms of addressing established barriers to treatment.

Topics	Direction of findings	Generalisability	Relevance to research question	Gap	Future research
			barriers can be a serious deterrent.		
Attrition	Treatment drop out related to more complex problems as well as impulsivity and mental health. A motivational letter provided before the first appointment appears to increase attendance.	Moderate with no Australian studies.	Treatment dropout is a huge problem for services in Australia with a huge proportion of clients accessing just one session.	Understanding how to improve engagement with treatment including blended treatment (e.g., mixing online with face-to-face).	Determine predictors of treatment drop-out of the service system in Australia. Determine what is meant by 'drop-out' from the perspective of the client.

Table 20. Summary of research findings for vulnerable groups

Topics	Direction of findings	Generalisability	Relevance to research question	Gap	Future research
Young people	Young people frequently participate in gambling amongst friends and report higher rates of problem gambling than the general population. Longitudinal studies indicate gambling problems may be set by age 20 years.	Almost all cross-sectional with one Australian study looking at international students.	Young people and gambling are particularly relevant to prevention.	Prevention and early intervention especially for people aged 15-17 may be important. There was a lack of Australian studies looking at youth gambling.	Undertake cross-sectional comparisons to predict gambling and gambling problems with large population datasets such as HILDA
Older people	Very limited research despite EGM gamblers becoming older.	No studies in Australia and low-quality evidence.	Older people may require targeted interventions especially for venue-based gambling.	There is very limited work in the area of older people at the time of the current review.	Determine what is meant by older people and the impact of age on gambling participation and problems.
CALD and Aboriginal	Evidence suggests CALD participate less frequently in gambling activities but have a higher rate of problems.	Cross sectional studies with two Australian studies with Aboriginal people.	Given this is a priority area there is surprisingly limited research.	There is very limited work in the area of CALD and Aboriginal people at the time of the current review.	Longitudinal studies involving CALD and Aboriginal people to understand the impact of prevention and harm minimisation interventions.
At-risk professions	Some professions that are high stress are consistently associated with less frequent gambling participation but more frequent problems.	Cross sectional studies with two from Australia.	Relevant in terms of vulnerable groups and ways of targeting and tailoring interventions.	Little is known of professions that consistently demonstrate risk of gambling problems beyond venue workers.	Identify professions that are at risk and develop and test evidence-based interventions that are tailored for their needs.
Economic	Evidence was mixed in terms of the impact of recession. There is some evidence that gambling participation may not substantially change but those who start gambling at this	Low quality studies with two non-systematic reviews examining the role of financial institutions.	Relevant in terms of the aftermath of COVID-19.	The likely economic downturn in 2020/2021 may bring with it increased financial problems that may see a change in gambling behaviours.	Monitor the impact of economic downturn with a longitudinal study of regular gamblers.

	time may be more prone to the development of problems.				
Other groups	Other vulnerable populations include those susceptible to family violence, comorbidity, homelessness and those within the correctional system.	Low quality studies that are mostly cross-sectional. One large scale systematic review included Australian offenders.	Family violence is an issue that may increase with stress and this may be important during economic downturn.	Interventions for family violence and other vulnerable groups were not discussed.	Determine a range of possible interventions that could be tailored for other vulnerable groups.

Table 21. *Summary of research findings for emerging technology*

Topics	Direction of findings	Generalisability	Relevance to research question	Gap	Future research
Internet gambling	Engaging in micro-betting associated with PG. Simulated gaming may be associated with real money gambling.	All cross-sectional with 3 of 5 studies Australian.	Harm from micro-betting may be relevant to prevention and policy.	Given the rise in simulated gambling in children's games more needs to be known of whether this predicts later PG.	Examine community attitudes towards stricter regulation of micro-betting. Determine the longer-term impact of simulated gambling on children and adults.
Convergence of gaming and gambling	There is a consistent positive association between gambling problems and loot box purchases. This is likely because of similar underlying mechanism.	All cross-sectional with concerns raised from Australian researchers.	Potential future impact of the convergence of gaming and gambling in terms of expansion of micro-transactions.	All of the research is cross-sectional with very limited longitudinal studies. The true cost of loot box gambling is also not known.	Determine the degree to which operators of gambling are looking to enhance engagement with gaming features.
Other developments	Player data are increasingly being mined to predict and warn players of limits being breached. This has great potential for both industry predatory practices and harm minimisation.	Cross sectional.	The use of player data has the potential to inform all areas of interest in this review.	Online providers overseas are already sharing data with researchers. The degree to which this is regulated or required by government in Australia needs clarification. There is a risk that access to these data are available only to those researchers with industry relationship or funding arrangements.	Examine the extent to which consumer protection frameworks accommodate the use of player data as a mechanism of intervention as well as risk.

Table 22. *Summary of research findings for prevalence of gambling*

Topics	Direction of findings	Generalisability	Relevance to research question	Gap	Future research
Participation in gambling	Overall a slight decrease in participation of EGM gambling and slight increase in online gambling including sports betting. In Australia participation in gambling ranged from 53% to 69%.	High generalisability as all studies employed representative samples.	Relevant to understand the target of prevention and intervention and changing patterns of gambling participation.	Track trajectories between types of gambling behaviours.	Expand prevalence surveys to have a greater focus on gambling harm.
Rates of at risk and problem gambling	Consistent findings around 10% of Australians experience some gambling related risk.	High generalisability as all studies employed representative samples.	The identification of low-risk gamblers is highly relevant to the development of appropriate and tailored prevention and early intervention.	National longitudinal Australian studies that track trajectories between levels of risk and types of gambling.	Understand risk and protective factors associated with levels of risk and transitions.
Problem gambling in vulnerable groups	Vulnerable populations including students, youth and at-risk professions consistently reported lower rates of participation and higher rates of problems.	High generalisability as all studies employed representative samples.	These findings are consistent with those in the vulnerable groups.	Risk and protective factors that predict gambling engagement and problem gambling.	Understand risk and protective factors that can reduce the rate of PG in vulnerable groups.
New forms of gambling	Consistently an increase in internet and online gambling across all jurisdictions. However, the association between internet gambling and problem gambling is mixed.	High generalisability as all studies employed representative samples.	These findings are consistent with those in emerging technologies.	Understand transitions between gambling forms and predictors of problem gambling.	Understand risk and protective factors associated with internet gambling.

Table 23. *Summary of research findings for understanding harm measurement*

Topics	Direction of findings	Generalisability	Relevance to research question	Gap	Future research
Conceptual understanding of harm	Broadening of the definition of harm but the need to be inclusive of Gambling Disorder.	Low quality evidence that is mostly proposed frameworks.	Relevant in so far as how harm is operationalised and addressed.	Harm across all segments of the community beyond the gambler.	The current framework lacks international consensus.
Measurement issues	A separate measure may be needed for harm and gambling dependence. Using the PGSI may underestimate harm.	Cross-sectional studies that were all Australian.	Knowing who is harmed is essential for harm minimisation efforts.	Valid and reliable screening tools are central to the measurement of harm. These are still being developed and tested.	Psychometric testing of a range of instruments that address harm and PG.














Table 24. *Summary of research findings policy and regulation*

Topics	Direction of findings	Generalisability	Relevance to research question	Gap	Future research
Public health approach	Conceptualisation of gambling harm by level of potency appears promising.	Low quality of evidence except for the systematic review on potency of gambling.	Most of the research is Australian based but is for the most part non-systematic reviews or opinions.	Public health approaches need to be defined based on evidence rather than opinion. These approaches should be mapped onto an established public health framework.	Examination of the potency model of addiction for gambling policy.
Advertising	A meta-analysis and multiple Australian studies consistently report a relationship between advertising, incentives and problem gambling.	Moderate quality of evidence consisting a meta-analysis and cross-sectional studies.	Prevention and harm minimisation efforts are potentially undermined by advertising and incentives to gamble.	This is a well-established area especially in terms of in-game promotions.	Translation of research findings.
Regulation issues	Low adherence to industry codes of practice and the need for a consumer protection framework for wagering. Research also identified methods to counter offshore betting.	Low to moderate quality involving surveys and interviews and audits of written documents.	Highly relevant in terms of the flow of research from piloting to effectiveness and the translation from research to regulation.	There is a disconnect between the importance of this topic and the quality of evidence.	Systematic review methodologies examining the impact of regulation.



## Appendix 1. MedLine Search Strategy

▼ Search History (13) View Saved

<input type="checkbox"/>	# ▲	Searches	Results	Type	Actions	Annotations
<input type="checkbox"/>	1	Gambling/	5434	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	 <a href="#">Contact</a>
<input type="checkbox"/>	2	(gambl* or betting or "sports bet*" or wager* or pokie* or EGM or slots or lotto or lotter* or keno or bingo or casino* or "video lottery terminal*" or ((gaming or fruit or slot or gamb*) adj1 machine*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	14289	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	
<input type="checkbox"/>	3	1 or 2	14289	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	
<input type="checkbox"/>	4	(treatment* or therap* or intervention* or rehabilitation or "harm reduction" or "self help" or "self-help" or "self directed" or self-directed or harm-minimi* or "harm minimi*" or responsible or prevent* or "self exclusion" or self-exclusion or ((scale* or measure* or screen*) adj3 harm*) or harm* or "public health" or policy or policies or regulat* or "health promotion" or prevalen*).mp.	12601543	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	
<input type="checkbox"/>	5	Rehabilitation/	18138	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	
<input type="checkbox"/>	6	Harm Reduction/	2972	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	
<input type="checkbox"/>	7	Public Health/	79980	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	
<input type="checkbox"/>	8	Public Policy/	31276	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	
<input type="checkbox"/>	9	Health Promotion/	72811	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	
<input type="checkbox"/>	10	Prevalence/	286709	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	
<input type="checkbox"/>	11	4 or 5 or 6 or 7 or 8 or 9 or 10	12601543	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	
<input type="checkbox"/>	12	3 and 11	7119	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	
<input type="checkbox"/>	13	limit 12 to (english language and humans and yr="2018 -Current")	656	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	

## Appendix 2. ProQuest Search Strategy

1

Name:

NSW RR 1198 [Edit name](#)

Searched for:

((noft(gambl\* OR betting OR ("sports betting" OR "sports bettors") OR wager\* OR pokie\* OR lotto OR lotter\* OR keno OR bingo OR casino\* OR "video lottery terminal\*" OR ((gaming OR fruit OR slot OR gamb\*) NEAR/1 machine\*))) AND (noft(treatment\* OR therap\* OR intervention\* OR rehabilitation OR "harm reduction" OR "self help" OR "self-help" OR "self directed" OR self-directed OR harm-minimi\* OR ("harm minimisation") OR responsible OR prevent\* OR "self exclusion" OR self-exclusion OR ((scale\* OR measure\* OR screen\*) NEAR/3 harm\*) OR harm\* OR "public health" OR policy OR policies OR regulat\* OR "health promotion" OR prevalen\*)) AND (stpe.exact("Scholarly Journals") AND la.exact("ENG") AND pd(20180901-20201231) AND PEER(yes))

Databases:

50 databases searched [View list](#)

*These databases are searched for part of your query.*

Notes:

23/04/2020 with all updated search terms

Saved:

23 April 2020

[Modify Search](#)

[Delete](#)

[Create alert](#)

[Create RSS feed](#)

[Get link](#)

### Appendix 3. PsychINFO Search Strategy

**▼ Search History (15)** View Saved

#	Searches	Results	Type	Actions	Annotations
1	exp Gambling/ or exp Gambling Disorder/	7768	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	<a href="#">Contract</a>
2	(gambli* or betting or "sports bet*" or wager* or pokie* or EGM or slots or lotto or lotter* or keno or bingo or casino* or "video lottery terminal*" or ((gaming or fruit or slot or gambli*) adj1 machine*)).mp. [mp=full, abstract, heading word, table of contents, key concepts, original full, tests & measures, mesh]	16216	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	
3	1 or 2	16216	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	
4	exp Treatment/	1037352	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	
5	(treatment* or therap* or intervention* or rehabilitation or "harm reduction" or "self help" or "self-help" or "self directed" or self-directed or harm-minimi* or "harm minimi*" or responsible or prevent* or "self exclusion" or self-exclusion or ((scale* or measure* or screen*) adj3 harm*) or harm* or "public health" or policy or policies or regulat* or "health promotion" or prevalen*).mp.	1713809	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	
6	exp Rehabilitation/	47430	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	
7	exp Harm Reduction/	3550	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	
8	exp Prevention/	58935	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	
9	exp Public Health/	29093	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	
10	exp Government Policy Making/	50433	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	
11	exp Health Care Policy/	12208	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	
12	exp Health Promotion/	24372	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	
13	4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12	1963512	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	
14	3 and 13	7877	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	
15	limit 14 to (human and english language and yr="2018 -Current")	728	Advanced	<a href="#">Display Results</a> <a href="#">More</a>	

### Appendix 4. Scopus Search Strategy

ID	Name	Query	Documents	Date last run	Actions
#5	NSW RR 3025	<p>(TITLE-ABS-KEY (gambli* OR betting OR "sports bet*" OR wager* OR pokie* OR lotto OR lotter* OR keno OR bingo OR casino* OR "video lottery terminal*" OR ((gaming OR fruit OR slot) W/1 machine)) AND (treatment* OR therap* OR intervention* OR rehabilitation OR "harm reduction" OR "self help" OR self-help OR "self directed" OR self-directed OR "harm minimi*" OR harm-minimi* OR prevent* OR responsible OR "self exclusion" OR self-exclusion OR ((scale* OR measure* OR screen*) W/3 harm) OR harm* OR "public health" OR policy OR policies OR regulat* OR "health promotion" OR prevalen*)) AND (LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "re")) AND (LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO (PUBYEAR, 2019) OR LIMIT-TO (PUBYEAR, 2018)) AND (LIMIT-TO (LANGUAGE, "English"))</p> <p><a href="#">View Less</a> <a href="#">Edit query</a></p>	3,025	23 Apr 2020	

## Appendix 5. Web of Science Search Strategy

Set	Results	Combine Sets	Delete Sets
	<div style="text-align: right;"> <input type="button" value="Save History / Create Alert"/> <input type="button" value="Open Saved History"/> </div>	<input type="radio"/> AND <input type="radio"/> OR <input type="button" value="Combine"/>	<input type="button" value="Select All"/> <input type="button" value="Delete"/>
# 2	<b>2,881</b> TS=((gambl* OR betting OR "sports bet*" OR wager* OR pokie* OR lotto OR lotter* OR slots OR EGM OR keno OR bingo OR casino* OR "video lottery terminal*" OR ((gaming OR fruit OR slot OR gambl*) NEAR/1 machine*)) AND (treatment* OR therap* OR intervention* OR rehabilitation OR "harm reduction" OR "self help" OR "self-help" OR "self directed" OR self-directed OR harm-minimi* OR "harm minimi*" OR responsible OR prevent* OR "self exclusion" OR self-exclusion OR ((scale* OR measure* OR screen*) NEAR/3 harm*) OR harm* OR "public health" OR policy OR policies OR regulat* OR "health promotion" OR prevalen*)) <b>Refined by: RESEARCH DOMAINS: ( SOCIAL SCIENCES )</b> <i>Databases=WOS Timespan=2018-2020</i> <i>Search language=Auto</i>	<input type="checkbox"/>	<input type="checkbox"/>
# 1	<b>10,894</b> TS=((gambl* OR betting OR "sports bet*" OR wager* OR pokie* OR lotto OR lotter* OR slots OR EGM OR keno OR bingo OR casino* OR "video lottery terminal*" OR ((gaming OR fruit OR slot OR gambl*) NEAR/1 machine*)) AND (treatment* OR therap* OR intervention* OR rehabilitation OR "harm reduction" OR "self help" OR "self-help" OR "self directed" OR self-directed OR harm-minimi* OR "harm minimi*" OR responsible OR prevent* OR "self exclusion" OR self-exclusion OR ((scale* OR measure* OR screen*) NEAR/3 harm*) OR harm* OR "public health" OR policy OR policies OR regulat* OR "health promotion" OR prevalen*)) <i>Databases=WOS Timespan=2018-2020</i> <i>Search language=English</i>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="radio"/> AND <input type="radio"/> OR <input type="button" value="Combine"/>	<input type="button" value="Select All"/> <input type="button" value="Delete"/>

Appendix 6. Current projects funded by the Responsible Gambling Fund (2019/2020)

Question	Title	Summary	Researcher
Harm min: Limit setting	Development and RCT of safe gambling guidelines for EGM play	RCT guidelines for safe pokies play.	CQU
Harm min: Limit setting (GRA funded)	Behavioural Trial 1 to support the National Consumer Protection Framework: NSW contribution	Impact of voluntary opt-out pre-commitment for different customer groups.	CQU
Harm min: Self-exclusion	Website development and evaluation for self-directed multiple gaming venue self-exclusion	Self-exclusion via an online site in NSW trial for venues.	University of Sydney
Treatment: iCBT	RCT comparing face-to-face with online self-directed and a combined model of gambling treatment	Blended treatment with face to face and online.	University of Sydney
Treatment: Family	Family member treatments: Systematic review and content analysis across addictions	Family member treatment review.	Deakin University
Treatment: Family	Addressing gambling harms experienced by female, concerned significant others	Service needs of family members in NSW.	Australian National University
Treatment: Engagement	Virtual Assistant (Chatbot): Facilitating Screening, Responsible Gambling Messaging, and referral	Engagement with GH website through chatbot.	Deakin University
Vulnerable groups: Youth	Exploring the changing landscape of gambling in childhood, adolescence and young adulthood	Impact of new gambling opportunities of adolescence.	CQU
Vulnerable groups: Youth	Young People and Gambling Research (patterns, impact, transitions from gaming)	Prevalence, attitudes, migration from gaming to gambling and the impact of advertising.	CQU
Vulnerable groups: Comorbidity	Early identification of gambling comorbidity in a hospital setting	Screening for gambling in comorbid populations.	Western Sydney University
Vulnerable groups: CALD	Culturally responsive framework to address problem gambling behaviours	Framework for mainstream services to deliver culturally responsive support.	Western Sydney Community Forum
Emerging: Structural characteristics	Smartphone betting on sports, esports and daily-fantasy sports amongst young people	Structural characteristics impacting on youth people smart phone betting.	CQU
Emerging: Structural characteristics	Do 'cash-out' products offered by bookmakers exploit behavioural biases?	Impact of new wagering product.	University of Sydney
Emerging: Gaming & gambling	Loot Boxes: Are they grooming youth for gambling?	Loot box expenditure and predictors of future gambling.	CQU
Emerging: Prevalence tech (GRA funded)	Interactive Gambling in Australia contribution towards GRA project	Re-examines 2014 interactive gambling study and the impact of changes to the gambling environment.	CQU

Appendix 7. Prevention, harm minimisation and RG studies

First author, year, location, Evidence rating	Study aims	Research design, Target group, sample size	Method	Main outcomes	Main finding
Abarbanel, 2019 USA Quality rating: Low	Examine casino employee perceptions of RG programs. Determine whether direct interactions with gamblers influence these perceptions.	Cohort survey  Employees of MGM Resorts International  N=2192	Surveyed employees regarding their perceptions of the RG programs, behaviours and beliefs about gambling and comfort with the company's RG environment.	Employees with less direct contact with gamblers were more likely to perceive RG programs to be effective at MGM than employees who have more direct contact with gamblers. Employees who worked in Food, Beverage, and Retail departments were more likely to hold misconceptions about gambling than employees in Back of House operations.	One-size-fits-all approaches to employee training might not be suitable for RG topics, and that position-based training might be necessary.
Auer et al., 2020 Norway Quality rating: Low	Explore perceptions of global loss limits across multiple online and offline platforms.	Survey  Online and offline Norsk Tipping gamblers  N=2352	Examined gambler awareness, attitudes and uptake of a mandatory limit setting feature implemented by Norsk Tipping.	Three-quarters were aware a global loss limit had been introduced, two-thirds of the sample knew how to set limits on their gambling, and four-fifths of the sample had a positive attitude towards the global loss limit. Very few gamblers switched to another gambling operator after they had reached their spending limits.	It is recommended that other gaming companies think about introducing global loss limits as another tool in the RG portfolio to help protect players and minimize harm.
Auer et al., 2018 Norway Quality rating: Moderate	Examine whether receiving personalized feedback of personally set monetary limits (exceeding 80% of limit) has an effect on online gambling behaviour.	Matched-pair design, those who received automated personalised feedback messages (RG tool) and those who did not.  Online gamblers, N=54,002  Target group (n=7,884) and control group (n=46,518).	Random sample of actively playing online gamblers examining gambling behaviour among those who received the automated personalised feedback message and those who did not receive the message.	Gamblers who received personalized feedback upon exceeding 80% of their global loss limit showed significant reductions in the amount of money gambled over a 3-month period.	The efficacy of the RG tool was demonstrated. RG tools appear to work in real-world settings with real gamblers in real time and real gambling websites (as opposed to evaluations in laboratory situations where the sample size is often very small and not necessarily representative of real gamblers because of the use of convenience sampling).
Auer, 2019 Norway	Exploration of the factors associated with uptake and use of an RG tool involving	Observational design. Analysis of a secondary data set containing player data	Analysis of 33 variables relating to player characteristics and gambling behaviour collected	The most important variables predicting a future limit-setting were players receiving feedback that they had reached 80% of their personal monthly global loss limit, personal monthly loss limit, the amount bet,	RG tool usage may be predicted based on a player's behavioural tracking data. Gambling operators can use these tools to predict which players will increase or decrease loss limits. Consequently,

First author, year, location, Evidence rating	Study aims	Research design, Target group, sample size	Method	Main outcomes	Main finding
Quality rating: Low	limit-setting, among online gamblers.	from a Norwegian gaming operator.  Online gamblers  N=70,789	from January through to March 2017. Using machine learning these variables were then used to predict the likelihood of players changing their monetary limits between April and June 2017.	theoretical loss, and whether the players had increased their limits in the past.	communication with players can be personalised about the utilization of pre-commitment (limit-setting) tools. Future research should evaluate whether other RG tools can also be predicted.
Auer, 2019  Norway  Quality rating: Moderate	Determine the impact of mandatory breaks in play for EGM gambling.	Matched pair design, data from gamblers who were forced to terminate a session for 90 seconds at 1-hour play duration was compared to data of players who did not experience forced session termination.  Video lottery terminal players  N=7190	Analysis of data collected by Norsk Tipping. A total of 218,523 playing sessions were analysed. Out of this sample, n = 4,290 sessions were both terminated, and a matched session was found. The 4290 sessions comprised 1,331 players.	There was no significant effect of the forced session termination and the amount of money staked in the subsequent gambling session or on the time duration of the subsequent gambling session.	Although expenditure was higher in the subsequent 24 hrs for terminated sessions, this may have been because those gamblers experiencing forced terminations were “heavier” gamblers in general and more likely to stake more money than others. This is due to the introduction of a selection bias because all sessions that last 60 min are subject to a mandatory play break, whereas the matched sessions last slightly less than 60 min.
Auer et al., 2020  Norway  Quality rating: Moderate	Determine the impact of voluntary money limit setting in an online gambling site.	Observational design. Analysis of a secondary data set containing player data from an online gaming operator.  Online gamblers  N=49,560	Analysis of an anonymised dataset of online player data detailing number of bets/gambles, wins/losses and voluntary deposit limit-setting.	There were no differences by age and gender but among the most gambling-intense players, those who had voluntarily set limits gambled significantly less money a year later compared with those who had not.	Voluntary limit-setting appears to be an effective RG tool because the top 10 percent most gambling-intense individuals in this study significantly reduced their gambling expenditure over a 1-year period.
Beckett, 2020  Australia	Determine the effectiveness and quality of RG training	Systematic review of articles assessing staff training programs.	Included studies were required to report staff training in any land-	Findings did suggest some benefits to staff overall, such as increased confidence in assisting individuals showing signs of harm.	Staff training programs should incorporate practical skill development for the

First author, year, location, Evidence rating	Study aims	Research design, Target group, sample size	Method	Main outcomes	Main finding
Quality rating: High	programs for land-based gambling.	Met inclusion criteria, N=22 publications, reporting N=17 studies, with N=687 participants.	based gambling venue, data to be collected first-hand, and face-to-face contact between staff and customers was required as part of the training program. Studies were excluded if it was an online gambling website, product sold online, or no face-to-face contact between staff and customers.	However, programs fell short in providing practical skills necessary to deal with difficult situations. Several methodological weaknesses were found in studies which precluded any substantive conclusions regarding the effectiveness of training programs.	management of individuals exhibiting behavioural indicators of PG.
Beckett, 2020 Australia Quality rating: Low	Determine barriers to venue staff applying an intervention where PG is identified.	Qualitative, focus groups.  Management and floor staff from a large NSW registered club venue  N=20	Focus groups examined the staff's ability to identify harmful gambling behaviours, barriers to intervention and potential improvements to the current program. Data were analysed using inductive thematic analyses.	Responses were consistent with the literature in demonstrating staff abilities to identify behavioural indicators, but importantly revealed a lack of certainty and understanding in relation to their specific roles, potential legal consequences and implications for employment by taking the initiative to proactively intervene.	Recommended improvements to strengthen the effectiveness of programs include the implementation of well-defined protocols setting out role expectations and procedures for floor staff to follow, and importantly, a fundamental shift in middle and senior management culture to one that actively supports and positively acknowledges staff-customer interactions designed to assist PG's.
Beecher, 2019 USA Quality rating: Moderate	Evaluate the impact of a PG training intervention on child welfare workers' capacity to detect, screen, and refer clients with gambling related problems.	Pre-post design.  Short-term F/U  Child welfare practitioners  N=21	The intervention delivered an educational and skills development component to aid the detection and screening of people experiencing gambling related harm over 3 hours. Participants volunteered to participate in the training program.	Workers (n=21) significantly increased their knowledge and recognition of PG behaviours from pre-test to post-test, but most of these knowledge gains were not sustained after 3 months. The motivation construct was significant across three timeframes and the behavioural items increased from post-test to 3-month follow-up, although not significant.	The intervention had more of an enduring change in participant's motivation and behaviour than it did on participants' knowledge.

First author, year, location, Evidence rating	Study aims	Research design, Target group, sample size	Method	Main outcomes	Main finding
Beresford, 2020 Australia Quality rating: High	Evaluate the impact of four different delivery methods for education materials on return to player.	RCT Infographic (n=33) Vignette (n=29) Brochure (n=28) Control – explanation of return to player as mandated by the Victorian government legislation (n=22).  No F/U  University students, N=112.	Following a baseline assessment of understanding participants were given an explanation of return to player in one of four forms – an infographic, vignette, brochure or control. Participants then completed a questionnaire assessing understanding of the concept.	Participants exhibited a lack of understanding of the concept of return to player at baseline. Contrary to predictions, exposure to any of the experimental conditions did not result in a greater understanding of return to player than controls.	Individuals have difficulty in understanding complex concepts related to return to player percentages when presented in current formats and content. Treatment and RG policies need to adopt strategies to effectively improve knowledge of this aspect of the structural characteristics of gaming machines.
Broussard et al., 2019 USA Quality rating: High	Determine the effectiveness of a digital gambling accelerator intervention.	RCT Accelerator (n=29) Brief MI (n=29) Control (n=29)  Assessments at 2 and 4 weeks.  Community sample of scratch-off ticket gamblers  N=87.	Participants randomised to one of three conditions. The digital accelerator program illustrated the odds and consequences of prolonged gambling of scratch-off tickets. The brief MI involved a feedback report and change plan. The control task was a six-page handout. Frequency of scratch-off gambling and money spend was assessed at F/U.	Gamblers in both active conditions reported a greater readiness to change than controls post-task. Those in the accelerator condition gave lower ratings of their chances of winning and urge to gamble. Participants in the accelerator condition gambled fewer days at the 2-week follow-up and spent less money at both the 2- and 4-week follow-ups compared to controls; no other between-subjects differences achieved statistical significance.	Digital gambling accelerators can impact several clinically relevant domains of gambling and may be useful as stand-alone or adjunct interventions to treat gambling problems.
Caillion et al., 2019 France Quality rating: High	Evaluate the effectiveness of a temporary self-exclusion measure for at-risk online gamblers.	RCT Self-exclusion (n=30) Control (n=30)  Short-term F/U.	Participants randomised to receive a 7-day non-reducible self-exclusion measure or gambling as normal. Randomisation was stratified based on	Self-exclusion had no short-term impact but did have a medium-term impact on gambling habits. After 2 months, the gambling-related cognitions (“illusion of control” and “the perceived inability to stop gambling”) and the subscale “desire” of the Gambling Craving Scale (GACS) decreased.	Several modifications have to be made to temporary exclusion mechanisms to improve its effectiveness and use. A longer duration of self-exclusion may be more effective at modifying gambling behaviour. Furthermore, benefits may be seen by



First author, year, location, Evidence rating	Study aims	Research design, Target group, sample size	Method	Main outcomes	Main finding
		At-risk online gamblers, N=60	game preference. Gambling behaviours, symptoms, and opinions of online gambling protections were assessed at baseline and F/U.		increasing awareness of its availability among gamblers by operators.
Calado et al., 2019 Portugal Quality rating: High	Evaluation of the efficacy of a gambling prevention program among high-school students.	RCT Intervention (n=56) No intervention control (n= 55)  High-school student, N=111.	Participants completed pre- and post-intervention questionnaires examining knowledge, misconceptions, and attitudes towards gambling, and gambling behaviours. The intervention comprised five, 1-hour weekly sessions and aimed to increase gambling-related knowledge and reduce factors associated with risky behaviour.	The intervention was effective in improving correct knowledge about gambling, reducing misconceptions and attitudes, and in decreasing the total hours spent gambling per week. The number of at-risk/PGs during the study period was also reduced in the intervention group. These findings were stable after a 6-week follow-up.	The intervention was effective in correcting some gambling-related behaviours. The present study reinforces the need for developing more interventions and provides important suggestions for future programs to improve its content and subsequent effects.
Castrén et al., 2019 Finland Quality rating: Low	Exploration of prison workers knowledge, views and opinions about PG.	Survey Prison workers, N=21	Participants completed a structured paper questionnaire assessing knowledge, skills, readiness to provide support for PG, and interest in continuing education about PG and related issues.	PG was considered to be a serious issue in Finland by 81% of participants. During the past year 94.1% had encountered a prisoner with a gambling problem. PG was identified in connection with discussions about prisoners' illegal activity (50%), financial situation (25%), or other problems (25%). Nearly half of the participants felt they did not have adequate training or information about PG and related issues and expressed an interest in continuing education.	It is necessary to increase awareness of gambling programs in a wider national context and to develop and evaluate the effectiveness of training programs.
Currie et al., 2019 Canada	Description of the research methodology and decision-making process for the	Secondary data analyses.	Data analysis results will be pooled to create recommendations for the guidelines to a	Once validated, the guidelines inform public health policy and prevention initiatives and will be disseminated to addiction professionals, policy makers, regulators,	The availability of the LRGs will help the general public make well-informed decisions about their gambling activities and reduce the harms associated with gambling.

First author, year, location, Evidence rating	Study aims	Research design, Target group, sample size	Method	Main outcomes	Main finding
Quality rating: Low	development of national Low Risk Gambling Guidelines.	General population dataset, N=50,000	nationally representative, multi-agency advisory committee.	communication experts and the gambling industry.	
Currie et al., 2019 Canada Quality rating: Low	Exploration of self-control strategies and the efficacy of limit-setting in reducing gambling related harm.	Survey Self-identified active gamblers, N=10,199	Participants were recruited from a pool of online panellists. The survey assessed gambling habits, use of control strategies including quantitative limit setting, and gambling related harm.	The most common control strategies were setting predetermined spending limits, tracking money spent, and limiting alcohol consumption. Use of self-control strategies was positively associated with gambling involvement, annual income, PG severity and playing EGM's. Approximately 45% of respondents failed to adhere to self-determined quantitative limits. People who stayed within their gambling limits were less likely to report harm even after controlling for other risk factors.	Public health interventions that promote lower-risk gambling guidelines aimed at helping gamblers stay within spending, frequency and duration limits are indicated.
Drosatos et al., 2019 UK Quality rating: Low Grey Literature	Exploration of the utility of or barriers to data sharing as a way to improve interactive persuasive interventions and limit setting in an online gambling environment.	Qualitative, interviews. Gamblers (n=6), gambling industry personnel (n=3), and addictions experts (n=13), N=22.	Participants were recruited on social media. Interviews addressed utilisation of data to aid more conscious gambling and potential barriers to data use. Content (experts and gamblers) and thematic analysis (industry personnel) methods were used.	Interviews with experts identified three types of limit setting (time, money, and access) and some key areas of consideration regarding design of intervention and type of data to be collected. Gamblers produced mixed responses, with some believing use of data to be useful, while others believed it may be too intrusive. The main barrier to data sharing by the gambling industry was aligned to commercial interests of gambling operators and providers.	The principles of data sharing and modalities for persuasive interactions proposed in this paper, such as requiring gambling operators to interact and share data within their various divisions and with the gamblers, are the first step to building transparent and accountable data sharing.
Engebo et al., 2019 Norway Quality rating: Low	Investigation of how RG measures are assessed by gamblers.	Survey General population gamblers N=9129	Participants were drawn from the Norwegian Population Registry for a postal survey. The survey assessed the degree to which gamblers believed specific RG measures would be helpful.	Between 35 and 42% had no opinion; of those with an opinion, most agreed the measures would be helpful. Predictors of positive beliefs included, female, young, playing random games only, being a moderate risk or problem gambler, reporting high impact from gambling advertisements, and agreeableness, openness and neuroticism. Only playing low risk games, high spending, and extraversion was	Positive beliefs about RG measures can relate to needs for external based countermeasures to minimize or reduce problems. Negative views may reflect a wish to play without obstacles, take risks or to trust in self-control.

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				inversely related to positive beliefs about RG.	
Fielder et al., 2020 Germany Quality rating: Low	Analysis of corporate social responsibility (CSR) programs and the influence of financial interests.	Content analysis and survey.  Operators (n=7) and slot machine gamblers in treatment (n=512).	Content of seven RG programs was analysed, with a focus on player protection measures. Gamblers recruited from treatment centres and asked whether staff noticed when they had significant losses or gambling problems.	RG programs list mostly mandatory measures, with the one exception being to approach possible PG's with the intention to help. However, operator staff approach only 1% of PG's. Among gamblers, 43.6% state they feel big losses are noticed by staff and of these 43.6% report not being approached. Very few reported feeling discouraged from continuing to gamble when approached, with 43.4% reporting being either lightly or strongly encouraged to continue playing.	The observed ineffective implementation of voluntary CSR measures is grounded in the strong financial incentive of operators to serve precisely the group they should stop from playing: PGs. We conclude that financial interests reduce the effectiveness of CSR.
Forsstrom et al., 2020 Norway Quality rating: Low	Assess the usage and effect of an RG tool among online players who began use and dropped out.	Primary and secondary data analysis.  Online gamblers, N=835	Player data were collected from Playscan, an RG tool which carries out a risk assessment, and provides feedback and advice for limiting gambling. Gambling data and risk-level from the online gambling operator was collected two weeks before using Playscan and two weeks after leaving Playscan.	These gamblers had a high initial use, but extensive lack of repeated use of the functions included in the tool (secondary data were used). The majority of the gamblers used Playscan for a short period of time. The results indicate that participants did not gamble less after using Playscan. Low-risk gamblers seemed to increase their gambling after using Playscan.	Level and length of use need to be taken into account when evaluating the effect of RG tools. The low level of use in this sample and in other studies implies that strategies to increase are needed.
Forsstrom et al., 2020 Sweden Quality rating: Very High	Assess the certainty of evidence and present short comings in the area of educational programs and consumer protection measures.	Systematic review and meta-analysis of preventative interventions.  Met inclusion criteria, N=28 studies, N=30,061 participants.		Only two measures (long term educational programs and personalized feed-back) had an impact on gambling behaviour. Follow-up period was short, and measures did not include gambling as a problem. The certainty in most outcomes, according to GRADE, was very low. Several shortcomings were found in the studies.	There is little support for RG measures and educational programs for gambling in the studies which met the inclusion criteria. More research is required to understand whether existing interventions are effective.
Gainsbury et al., 2018	Exploration of gambler cohorts to improve	Qualitative, focus groups.	Four focus groups were conducted on an online	Seniors preferred messages about limit setting, whilst young adults and frequent	The wording of message content will likely influence the effectiveness of such messages

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Canada  Quality rating: Low	customisation of RG messages.	Random community sample of young adults (n=10), seniors (n=10), frequent gamblers (n=9) and skill game gamblers (n=10)  N=39.	platform in a written format. Participants were asked to respond to six pre-developed RG messages. Responses included opinions, whether they would engage with the message and why, and any changes they would make.	gamblers responded to messages about their own play and expertise. Skill game gamblers were interested in the odds of winning and their own outcomes over time. All groups agreed that using positive, non-judgmental language in messaging is important.	differentially across various groups of gamblers for engaging gamblers in harm reduction tools.
Gainsbury et al., 2020  Australia  Quality rating: Low	Exploration of online gamblers' perceptions, motivators and barriers to using consumer protection tools.	Survey  Online gamblers  N=564.	Participants recruited by six online wagering operators. Survey asked about use and attitudes towards RG tools, specifically deposit limits, time out and activity statements.	Most participants were aware of the tools and had accessed activity statements; few had used deposit limits (24.5%) or time-outs (8.1%) but use of these restrictive tools was higher among those at-risk of gambling problems. Participants generally reported satisfaction with tools, and correct usage. Only moderate changes in behaviour were reported. The restrictive tools were seen as less relevant and perceived to be for PG's resulting in reduced use.	Efforts are needed to encourage perception that tools are relevant for all customers. Changes to terminology and promotion of tools can be undertaken by gambling operators and policy makers to improve utilisation and effectiveness of tools.
Grande-Gosende et al., 2020  Spain  Quality rating: High	Summarize existing evidence for prevention programs aimed at young adults.	Systematic review  Inclusion criteria: Prevention programs focused on gambling, describe program in detail, demonstration of efficacy (pre-post), young adults (18 – 35 years), primary data.  Met inclusion criteria, N=9 studies, N=1719	Studies were excluded if they were reviews, editorials or opinion pieces, only reported qualitative data, not in Spanish, English or French, sample out of age range, primary focus of program was not on gambling.	All studies targeted college or university students and followed a selective or indicated prevention strategy. A Personalized Normative Feedback approach was incorporated in most of the studies, which had generally good results in reducing and/or minimizing at-risk or PG.	There is a need to address scientific quality standards before proceeding with the design, implementation and widespread dissemination of these preventive programs and a need to ensure programs' efficacy prior to implementation.
Gray et al., 2019  USA	Exploring gamblers perceptions of stakeholder responsibility for	Survey  Gamblers,	Participants recruited from a large resort and gambling venues' loyalty card database.	Most participants (74.5%) held individual gamblers responsible. However, participants who screened positive on the PG screen had more diffuse conceptions of responsibility	These gamblers viewed individual gamblers as most responsible for minimizing harms associated with gambling and were much less likely to hold other groups accountable,

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Quality rating: Low	minimizing gambling harm.	N=3748.	Participants surveyed regarding their perceptions of responsibility. They also completed a gambling screen and measures assessing RG behaviour, beliefs, and understanding.	and were more likely to hold five particular stakeholder groups responsible (e.g. MGM Resorts employees, government regulators, public safety officials). This distributed sense of responsibility predicted the PG screen score over and above other risk factors measured.	despite recent government mandates and industry initiatives to promote RG. These perceptions relate to gamblers' experience of gambling harm.
Gray et al., 2020 USA Quality rating: Moderate	Examination of the reach of a newly launched RG information centre in casino venues.	Survey  Surveys conducted in two waves.  Wave 1 (n=982), wave 2 (n=691).  Casino visitors, N=982	Services of the RG centres were documented to compile an electronic checklist for monitoring program data completed by RG advisors. Casino visitors surveyed about their self-reported learning at two time-points.	Program staff reported engaging directly with approximately 1% of daily patrons, 70% of which were casual interactions. For the others program staff typically provided information about RG, consistent with patrons' self-reported needs and concerns. Among a sample of the most involved patrons (n=129) those with less program exposure were more likely to hold an accurate gambling belief but less likely to report having set time limits on their casino visits.	There was no support for the notion that using an on-site information centre to teach patrons about important gambling concepts is associated with more RG behaviour.
Guilcher et al., 2020 Canada Quality rating: Low	Understanding the factors related to screening for PG among healthcare and social services providers.	Qualitative, concept mapping.  Healthcare and social services providers,  N=20	Concept mapping facilitates collaborative, participant driven data collection and analysis. Participants were guided by a focal prompt addressing what would make things easier to implement routine screening for gambling.	A five-cluster map was developed including: (a) system and policy factors, (b) characteristics of the screening tool, (c) staff skills and training, (d) screening process, and (e) team resources and support for the screening process. Staff skills and training was rated as the most important and the most realistic cluster to implement, while screening was rated relatively as the least important when compared to the other clusters. Team resources and support was rated relatively as the least realistic cluster.	By identifying the needs of healthcare and social service providers, this study co-developed actionable suggestions that will assist providers in routinely screening for PG.
Hing et al., 2019 Australia	Identify a set of evidence-based safe gambling practices (SGPs) for consumers and examine their usage.	Survey  Regular gamblers (at least monthly),  N=1174	Participants were recruited online and completed a survey measuring uptake of 43 potential safe gambling practices, gambling	Nine SGPs best predicted non-harmful gambling: stop if they are not having fun (most linked to reduced harm), keep a household budget, keep a dedicated gambling budget, have a fixed amount they can spend, engage in other leisure activities,	These SGPs form the basis of evidence-based safe gambling guidelines which can be: 1) promoted to consumers, 2) form the basis of self-assessment tests, 3) used to measure safe gambling at a population level,

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Quality rating: Low			harms, and numerous risk factors for harmful gambling.	avoid gambling when upset or depressed, not use credit for gambling (most linked to harm), avoid gambling to make money, and not think that strategies can help you win.	and 4) inform supportive changes to policy and practice.
Hing et al., 2020 Australia Quality rating: Low Grey Literature	Build an evidence base for enhancements to RG requirements, practices and training.	Mixed methods, literature review, survey and focus groups.  Responsible conduct of gambling accredited staff,  N=2,298 (survey) and N=20 (focus groups).	Online survey asked about exposure to gambling related activities, RG practices and experiences, training and suggested improvements. Focus groups were designed to expand on these results.	Most employees reported that their venues implement regulated RG practices, they rarely approach patron who show signs of PG but do not ask for help, the current approach to RG is having little impact on harm prevention or reduction, substantial changes to RG practices and training in NSW is needed.	Substantial change is required across a broad range of practices that: make the gambling product and environment safer; limit the accessibility of EGMs; strengthen requirements for venues to proactively identify, intervene and support patrons gambling at harmful levels; and require venues to demonstrably reduce gambling harm amongst their patrons.
Ho et al., 2019 Macau Quality rating: Low	Explore the influence of casino servicescape on unplanned gaming behaviours and the role of perceived behavioural control.	Survey  Casino visitors (non-problem or pathological gamblers),  N=475	Conducted a street intercept survey asking participants about the casino servicescape and perceived internal and external control.	A negative indirect effect of casino servicescape evaluation on customers' unplanned gaming behaviours through perceived internal control was found. Casino customers' perceived external control does not mediate the relationship between casino servicescape evaluation and unplanned gaming behaviours.	A favourable casino servicescape may enhance customers' perception of control over their personal resources (e.g. skills and knowledge), which in turn facilitate self-regulation of their unplanned gaming behaviours.
Hollingshead et al., 2019 Canada Quality rating: High	Examining how the timing of RG education provision impacts RG intentions using a virtual reality slot machine.	RCT  Active condition (n=49) Passive condition (n=49)  Community sample of EGM players,  N=98	Participants were shown an RG-oriented educational animation prior to initiating play (passive) or in advance of making a decision about whether to continue playing after their money limit was reached (active). Desire to continue and intention to set a limit was assessed.	Players in the active condition were more likely to express an intention to set a money limit in their upcoming gambling session at the gaming venue. Disordered gambling symptomatology moderated this effect—players low (compared to those high) in disordered gambling symptomatology expressed greater intention to set a money limit (active condition).	Learning RG actively (i.e. pairing RG education with its associated behaviour, in vivo) can increase players' intention to gamble responsibly.
Hollingshead et al., 2019	Test the effect of behavioural feedback messages on monetary	Study 1 - RCT	Participants gambled with a pre-set money limit. Players were	Limit adherence did not vary by condition. Half of the participants could not recall the content of the pop-up message.	Many players do not read the content of pop-up messages, thus they may not be an

First author, year, location, Evidence rating	Study aims	Research design, Target group, sample size	Method	Main outcomes	Main finding
Canada  Quality rating: High	limit adherence using a virtual reality slot machine.	Notification of limit (n=63), personalised feedback (n=68)  Community sample of gamblers,  N=124	either informed when their limit had been reached, or received additional personalized behavioural feedback about how much money and credits they lost. Adherence to limit was measured.		effective means for conveying enhanced RG information.
Hollingshead et al., 2019  Canada  Quality rating: High	Test the effect of behavioural feedback messages on monetary limit adherence using a virtual reality slot machine.	Study 2 – RCT with 2 x 2 design (message type x delay)  10s delay, personalised (n=28) 10s delay, simple (n=25) No delay, personalised (n=26) No delay, simple (n=30)  Community sample of gamblers N=109	Participants gambled with a pre-set money limit. Participants either received a personalised feedback pop-up message or a message stating a monetary limit had been reached. Participants could either cancel the message straight away or had to wait for a 10 second delay.	Personalized behavioural feedback did not improve limit adherence. Approximately 50% of players in both conditions could not recall the content of the pop-up message.	Many players do not read the content of pop-up messages, thus they may not be an effective means for conveying enhanced RG information.
Ivanova et al., 2019  Finland  Quality rating: High	Examine the effect of a deposit limit prompt on gambling intensity among online gamblers.	RCT  Randomised to receive prompt at registration (n=1098), pre-deposit (n=1110), post-deposit (n=1055), or no prompt control (n=1065).  Online gamblers,  N=4328	Prospective customers of a gambling operator were randomized into one of the four conditions and tracked for 90 days from account registration. Gambling intensity was measured by aggregated net loss.	There were no differences between conditions in proportion of participants with positive net loss or size of positive net loss. Intervention groups had higher rates of limit-setters than control. Customers who have increased/removed a previously set deposit limit had higher net loss than the limit-setters who have not increased/removed their limit, and unprompted limit-setters lost more than unprompted non-setters.	Prompting online gamblers to set a voluntary deposit limit of optional size did not affect subsequent net loss compared to unprompted customers, motivating design and evaluation of alternative pre-commitment tools. Setting a deposit limit without a prompt or increasing/removing a previously set limit may be a marker of gambling problems and may be used to identify customers in need of help.

First author, year, location, Evidence rating	Study aims	Research design, Target group, sample size	Method	Main outcomes	Main finding
Ivanova et al., 2019 Finland Quality rating: Low	Examination of the effect of RG tools on non-PGs on an online platform.	Survey Online gamblers, N=1223	Participants were recruited from a pool of active online gamblers. Participants were surveyed regarding overall reactions, attitudes, disturbance and irritation towards RG tools, as well any inclinations to change gambling services due to RG tool over exposure.	Non-PGs had positive experiences of RG tools. Moderate-risk gamblers had more positive overall reaction and less irritation to previous experiences of RG tools compared to non-PGs. PGs had least positive attitudes, most disturbances and most irritation towards RG pictures. Non-PGs had lowest rates of having abandoned a service because of perceived overexposure to RG tools.	Non-PGs were not particularly disturbed by RG tools and were not at risk of abandoning online gambling services because of overexposure to RG tools. The study found no grounds for limiting the design and implementation of RG tools due to fears of disturbing recreational gamblers.
Jonsson et al., 2019 Norway Quality rating: High	Investigate the effect of providing personalised feedback on gambling intensity among high consumers of venue and online gambling.	RCT Telephone (n=1003) Letter (n=1003) No contact control (n=1003) Data collection for 12 weeks prior and after intervention. Medium-term F/U. High expenditure online gamblers, N=3009	Statistical triplets, matched on sex, age, and net losses. Call and letter utilised motivational interviewing techniques and focused on estimating expenditure, giving feedback and suggestions for action. Participants in the letter and call condition randomised to receive F/U letter/call at 4 weeks.	Over 12 weeks, theoretical loss decreased 29% for the phone and 15% for the letter conditions, compared with 3% for the control group. A positive effect of the follow-up contact was limited to participants who at the initial call indicated an interest in receiving a follow-up call. Follow up at 12 months found telephone intervention with customers had a larger impact than a mailed letter.	Contacting heavy consumers of gambling about their expenditure appears to be an effective method for gambling companies to meet their duty to care for customers.
Keen et al., 2019 Australia Quality rating: Low	To develop a clear theoretical framework to inform the content and delivery of gambling education initiatives and address some practical issues with delivery.	Literature review.	Literature was reviewed across fields of psychology, public health, and pedagogy to provide key recommendations to improve the outcomes of gambling education.	Advancements centre on shifting messages away from gambling harm to applying a cognitive-developmental framework and increase engagement with youth, exposing misconceptions about gambling requires teaching the mathematical principles that underpin them, the pedagogical field provides insights into teaching complex	Four key recommendations were made for the development of future gambling education programs focusing on theoretical approach, specialized content, and delivery.



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				concepts, and computer-assisted teaching methods may also assist.	
Knaebe et al., 2019 Australia Quality rating: Low	Examination of behaviour change strategies endorsed by gamblers subtyped by psychological distress, risky alcohol use and impulsivity.	Survey Gamblers N=385	Participants were from a larger project, they completed an online survey regarding gambling behaviours, PG severity, distress, impulsiveness, alcohol use, and change strategies.	Distinct subtypes of current, past and non-PGs were identified. The most helpful change strategies for current and past gamblers were similar across subtypes (i.e., accept that gambling needs to change, remind yourself of the negative consequences). Non-PGs reported the most helpful strategy as setting financial limits.	Treatment of psychological distress, risky alcohol use or impulsivity may be important for all gamblers regardless of their level of risk.
Lischer et al., 2018 Switzerland Quality rating: Low	Examine the reasons that lead to the application for voluntary exclusions.	Secondary data analysis, content analysis.  Interviews conducted with gamblers by casino shift managers  N=8,170	Analysis of data obtained during interviews with gamblers, an unvalidated questionnaire based on the DSM-IV criteria and documents completed by gamblers who successfully had their exclusion terminated.	Most players had found other ways to gamble, during the exclusion period. The main reason gamblers gave for wishing to remove their ban was wanting to be able to visit a casino again.	The overarching objective of Switzerland's exclusion policy—an enduring abstinence from gambling—needs in turn to be modified. The question then arises as to whether exclusions should be the only means of protecting gamblers who are deemed to be at risk. The possibilities for individual limitations on the frequency of visits, or the stakes, should both be discussed as another measure of player protection.
Lole et al., 2019 Australia Quality rating: Low	Examine the extent to which RG messages are looked at, in the wider context of gambling advertisements. Focus is on sports betting.	Regular sports bettors' and non-gamblers response to RG messages  No control group  No F/U  Sports bettors, N=59	Participants viewed a series of sports betting advertisements, while an eye-tracker recorded the number of fixations on RG messages, as well as other text-based wagering content.	Significantly fewer fixations were placed on RG messages, compared to wagering information however, this effect did not differ according to level of gambling risk. The number of fixations placed on the different types of RG messages was found to vary, based on gambling risk as well as, what appears to be, the physical characteristics of these messages.	Few fixations were placed on, or near, RG messages, compared to other wagering information, meaning that, in their current form, they are unlikely to be effective in protecting against gambling harm. Presenting messages on a high-contrast/block-colour background increases the number of fixations on these.
Luquiens et al., 2018 France	Assess the reliability of self-exclusion motives in self-reports to the gambling service provider.	Secondary data analysis.  Self-excluding online poker gamblers	All poker gamblers who self-excluded at least once from the gambling website since its launch, and who provided reasons for	No between-group adjusted difference was found on gambling summary variables. More than two-thirds of the gamblers resumed poker gambling after a first self-exclusion (n=1368), half of them within the first month. No between-group difference	Reported motives for self-exclusion appear non-informative and could be misleading. Multiple self-exclusions seem to be more the rule than the exception. The process of self-exclusion should therefore be optimised

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Quality rating: Moderate		N=1996	this self-exclusion were included. Two groups were explored, those who self-reported an addiction related or commercial motive.	was found for the course of gambling after the first self-exclusion. 60.1% of first-time self-excluders self-excluded again (n=822). Losses in the previous month were greater before second self-exclusions than before the first.	from the first occurrence to protect heavy gamblers.
Luquiens et al., 2019 France Quality rating: Moderate	Assess the effects of self-exclusion in online poker gambling compared to matched controls.	Secondary data analysis.  Assessment periods: 4 weeks prior to exclusion and at 3, 4, 6 and 12 months after exclusion end date.  Online poker gamblers,  N=4451	Retrospective data collection from gambling provider databases. First-time self-excluders were matched for gender, age, and account duration. Data collection included characteristics of the self-exclusion and gambling variable data (time and money).	Significant effects of self-exclusion and short-duration self-exclusion were found for money and time spent over 12 months. Among the gamblers that were the most heavily involved financially, no significant effect on the amount spent was found. Among the gamblers who were the most heavily involved in terms of time, a significant effect was found on time spent. Short-duration self-exclusions showed no significant effect on the most heavily involved gamblers.	Self-exclusion seems efficient in the long term. However, the effect on money spent of self-exclusions and of short-duration self-exclusions should be further explored among the most heavily involved gamblers.
Matheson et al., 2019 Canada Quality rating: Moderate	Explore the literature on use of self-management strategies for PG.	Scoping review.  Studies were included if they examined PG self-management strategies used by adults (18+), and where PG was confirmed using a validated measure.  Met inclusion criteria  N=35 studies, with N=6415 participants.	Studies were excluded if they only included face-to-face treatment without a self-management component, peer support groups, strategies that focused only on gaining knowledge and awareness, and studies examining treatment-seeking behaviour.	The majority of studies examined self-exclusion (39%), followed by use of workbooks (35%), and money or time limiting strategies (17%). The remaining 8% focused on cognitive, behavioural and coping strategies, stress management, and mindfulness.	Given that a minority of people with gambling concerns seek treatment, that stigma is an enormous barrier to care, and that PG services are scarce and most do not address multi-morbidity, it is important to examine the personal self-management of gambling as an alternative to formalized treatment.
McGivern et al., 2019 UK	Compare the effectiveness of expenditure-specific, generic and control messages during	RCT  Expenditure specific (n=15) Generic (n=15)	Participants were shown one of three pop-messages when they reached a certain loss threshold. The	Expenditure-specific warning messages demonstrated significant reductions in wager amounts compared with other message types. No significant differences were found between Generic and Control	Expenditure-specific warning messages exhibit potential for ameliorating potentially harmful gambling behaviour. Expenditure-specific messages should be tested in a broader range of gambling contexts to

First author, year, location, Evidence rating	Study aims	Research design, Target group, sample size	Method	Main outcomes	Main finding
Quality rating: High	simulated online roulette.	Control (n=15)  Convenience sample of university students,  N=45	message contained a specific loss amount in real time, a general aversive gambling message, or no warning contact. Expenditure after the message was measured.	messages. Thus expenditure-specific warning messages about current losses were more effective than generic messages for reducing expenditure.	examine their generalizability and potential for implementation in the gambling industry.
McMahon et al., 2019  UK  Quality rating: High	Evaluation of the evidence base for the effects of prevention and harm reduction interventions.	Umbrella review.  Inclusion criteria: prevention or harm reduction interventions, assessing changes in gambling related behaviour or harm.  N=10 systematic reviews, reporting on N=55 unique primary studies.	Articles were excluded if they were not a systematic review, not an effectiveness review, or only focused on treatment interventions.	Evidence-base related to pre-commitment and limit-setting (24%), self-exclusion (20%), youth prevention programs (20%), and machine messages/feedback (20%). The effectiveness of harm reduction interventions are limited by the extent to which users adhere to voluntary systems. Less than half of the studies' examining youth prevention programs demonstrated positive effects on behaviour. No review extracted data or reported on the differential effects of intervention strategies across sociodemographic groups.	The evidence base is dominated by evaluations of individual-level harm reduction interventions, with a paucity of research on supply reduction interventions. Review conclusions are limited by the quality and robustness of the primary research. Future research should consider the equity effects of intervention strategies.
Motka et al., 2018  Germany  Quality rating: High	Description of the sociodemographic features and gambling behaviour of self-excluders.	Systematic review.  Self-excluding gamblers.  N=16 studies, N=17, 174	Inclusion criteria: examination of self-excluders, English or German, using quantitative, qualitative or mixed methods.	Online self-excluders were on average 10 years younger than terrestrial self-excluders. Self-exclusion was mainly motivated by financial problems, feelings of losing control and problems with significant others. Main barriers to self-exclusion were complicated enrolment processes, lack of complete exclusion from all venues, little support from venue staff, and lack of adequate information on self-exclusion programs	To exploit the full potential of self-exclusion as a measure of gambler protection, its acceptance and its utilization need to be increased by target-group-specific information addressing financial issues and the role of significant others, simplifying the administrative processes, facilitating self-exclusion at an early stage of the gambling career, offering self-determined exclusion durations, and promoting additional use of professional addiction care.
Newall et al., 2020  UK	Test how gamblers perceived chances of winning would vary with different warning labels.	RCT  Return-to-player condition House-edge condition	Players completed three trials in random order where the magnitude of the house-edge was varied and they were	Participants rated their perceived chances of winning as higher in the return-to-player condition than the house-edge condition. Perceived chances of winning are subjective, however, and hence there is no 'correct' response to experiment 1.	Experiment 2 was designed to address this limitation, by assessing whether participants would answer the four-alternative multiple-choice question correctly more often with a house-edge than return-to-player label.

First author, year, location, Evidence rating	Study aims	Research design, Target group, sample size	Method	Main outcomes	Main finding
Quality rating: High		Online gamblers, N=399	asked to report their chances of winning.		
Newall et al., 2020 UK Quality rating: High	Explore how warning labels were understood by gamblers.	RCT Return-to-player condition House-edge condition Online gamblers, N=407	Participants were given either a return-to-player or house-edge warning label (both equivalent to a house-edge of 10%), and asked to complete the multiple-choice measure of understanding used in the previous experiment.	In total, 66.5% of participants in the house-edge condition answered the understanding question correctly, which was shown by logistic regression to be significantly more than the 45.6% of participants in the return-to-player condition	House-edge warning labels on electronic gambling machines and online casino games, which explain what a gambler might expect to lose, could help gamblers to pay greater attention to product risk and would be better understood by gamblers than equivalent return-to-player labels.
Parham et al., 2019 USA Quality rating: Moderate	To enhance the relevance and effectiveness of a youth gambling prevention program: Maryland Smart Choices.	Mixed methods. Pre-post and focus groups. Middle and high school students, N=72. Clinicians serving as co-facilitators, N=5.	Sessions were 3x 45-60 minutes once per week. Program focuses on educating about gambling and positive decision making. Students' knowledge and vulnerability to gambling addiction was assessed 15 min prior to first session and 1 week following completion.	Improvements in knowledge about gambling and student vulnerability to gambling addiction were observed. However, a small percentage of students continued to endorse incorrect responses or expressed uncertainty related to key aspects of gambling and problematic gambling at post-assessment. This may have been the result of question wording.	Significant increases in student awareness and knowledge following participation in MD-Smart Choices were observed. High student engagement and participation, program feasibility, and ease of implementation were also observed.
Parke et al., 2019 Scotland Quality rating: High	Investigation of the effect of response latency and persistence on gambling.	RCT Intervention group (n=37) Control (n=37) Community sample of recent gamblers who had played a rapid, continuous gambling	Participants played a simulated card based-gambling task. Control group had a standard break-in-play (3-minute freeze). The intervention utilised a break that required both motor control and response inhibition when presented with a	Although there was no main effect for experimental condition on gambling persistence, both interventions were effective in elevating response latency during a period of sustained losses. Within-game interventions that require active involvement appear to be more effective in increasing response latency than standard, passive breaks in play.	Gambling sessions that are interrupted with a brief break in play lead to longer response latencies during periods of sustained losses, in comparison to no break in play.

First author, year, location, Evidence rating	Study aims	Research design, Target group, sample size	Method	Main outcomes	Main finding
		format in the last 6 months, N=74	stop sign. Gambling persistence was measured.		
Peter et al., 2019 USA Quality rating: Very High	Evaluation of personalised feedback interventions (PFIs) in terms of content, mode of delivery, target sample and efficacy.	Meta-analysis.  Inclusion criteria: studies that evaluate the efficacy of brief feedback intervention for gambling behaviour.  Met inclusion criteria, N=11 studies, reporting N=16 interventions,  N=968.	Studies were excluded if they were not peer-reviewed, did not include feedback as a central component, involved more than one treatment session involving direct contact with the interventionist, did not utilize randomisation and did not report data on a non-intervention control.	A small, statistically significant effect in favour of PFIs vs. controls was found. These interventions appeared to be most efficacious when used in populations of greater gambling severity, when individuals were provided with gambling-related educational information, and when used in conjunction with motivational interviewing. Factors associated with reduced efficacy include in-person delivery of feedback without motivational-interviewing and informing participants of their score on a psychological measure of gambling severity.	PFIs are a low cost, easily disseminated intervention that can be used as a harm-reduction strategy. However, more substantial effects may be attained if used as part of a larger course of therapy.
Pickering et al., 2019 Australia Quality rating: Low	Understanding the consumer perspective of a multi-venue self-exclusion program.	Qualitative, interviews.  Current (n=13) and former (n=7) participants of a multi-venue self-exclusion program,  N=20.	Participants were asked open-ended questions about their experiences and opinions of the program, including its strengths and weaknesses, and suggested improvements for future consumers.	Participants found self-exclusion beneficial. Several shortcomings of the program were expressed, including lack of available public information and overly complicated registration processes. Participants lacked confidence in venues' willingness and ability to identify non-compliant gamblers and highlighted the need for vastly improved detection systems. The quality of interactions with venue staff in relation to self-exclusion were mixed; counsellor support, however, was perceived as important from beginning to end of a self-exclusion period.	Gambling operators should increase marketing efforts to promote the availability and benefits of self-exclusion. Investigation of strategies to streamline registration processes and to augment detection systems with new technologies was supported. Venue staff may benefit from training in appropriate self-exclusion facilitation procedures. Gambling operators should aim to foster strong links between self-exclusion programs and professional gambling counselling services.
Proctor et al., 2019 Australia	Understand the use of consumer protection tools among Internet gambling customers.	Survey  Assessments at baseline and 2 weeks.  Online gamblers,	Participants recruited from online wagering operators. Survey assessed whether the Theory of Planned Behaviour explained	Past tool use, attitudes and subjective norms, but not perceived behavioural control, were positively correlated with intention to use consumer protection tools. Intention to use the tools prospectively predicted actual tool use. The Theory of Reasoned Action rather	Use and application of consumer protection tools on gambling websites is not perceived as effortful, but under volitional control and straightforward. Positively influencing individual attitudes, perceived views of others and past tool use could increase

First author, year, location, Evidence rating	Study aims	Research design, Target group, sample size	Method	Main outcomes	Main finding
Quality rating: Moderate		N=564 (follow-up, N=193)	intention to use tools and actual behaviour.	than Theory of Planned Behaviour, appears to be a suitable conceptual model to understand consumer protection tool use for Internet wagering websites.	online wagering customers' use of consumer protection tools.
Rafi et al., 2019 Sweden Quality rating: Low	Exploration of participant experiences of a Workplace-Oriented Problem Gambling Prevention Program for Managers and HR Officers	Qualitative, interviews. Managers (n=13) and HR officers (n=10), N=23.	Semi-structured interviews were carried out covering organization's early work with PG, policy implementation and the template, skills-training, the checklist, and other thoughts or questions regarding the project.	The creation of a feasible skills-development training program with relevant components can be considered a strength. Weaknesses include not tailoring the skills-development to the organization and including components that were not used by the participants (i.e., the template and the checklist).	Intervention components that were appreciated by the participants were found. These included getting the support of consultants in the implementation process as well as following up on the results over time to minimize the risk of the potential changes inspired by the training gradually fading away.
Ren et al., 2019 USA Quality rating: Moderate	Assess the long-term effectiveness of a school-based youth gambling prevention program in Illinois.	Pre-post Students (8-18 years old), N=16, 262. Gambling screen, N=16,421.	Participants completed pre-post knowledge test and/or a gambling screen. The intervention consisted of a PowerPoint presentation containing educational prevention material.	Of the 16, 262, 21.3% received the intervention at least twice. Students receiving multiple interventions had higher scores on the pre-test as compared to those receiving a single intervention, and they demonstrated an increasing trend of awareness about gambling over time. The prevalence of PG had decreased among students receiving the intervention twice as compared to receiving the intervention once. However, this effect was not confirmed among students receiving the intervention three or more times.	The DGAOF program has demonstrated a positive long-term impact on increasing gambling knowledge and partially reducing pathological gamblers through direct training. It suggests that multiple repeated interventions are important for youth gambling prevention.
Riley et al., 2018 Australia Quality rating: Low	Investigation of how PGs experience being identifies and referred for treatment by venue staff.	Qualitative, focus groups and interviews. PG's (n=22), counsellors (n=8), and venue staff (n=10), N=40.	A semi-structured interview guide focusing on experiences and perceptions of PG identification and referral in gaming venues was used to conduct 4 focus groups and 9 semi-structured in-depth interviews.	'Role conflict' was identified as a considerable source of stress for venue staff who described conflicting priorities in responding to PGs whilst maintaining employer profit margins. PGs described offers of help from venue staff as hypocritical and disingenuous. Venue staff also described reluctance to make moral judgements through the identification of and engagement with PGs, and gamblers	Role conflict experienced by gambling venue staff and patrons alike inhibits effective referral of potential PGs into treatment. Reducing the need for gambling venue staff to make a perceived moral judgement about the gambling behaviours of specific patrons may improve the reception of RG information and promote help-seeking.

First author, year, location, Evidence rating	Study aims	Research design, Target group, sample size	Method	Main outcomes	Main finding
				described resentment in being singled out and targeted as a problem gambler.	
Rodda et al., 2018 Australia Quality rating: Low	Compile a comprehensive inventory of change strategies based on perceived helpfulness.	Cross-sectional Gamblers, N=489 (including PG, n=333)	Strategies were compiled and grouped into a priori groups. Participants recorded whether they had used the strategy and then rated it for its perceived helpfulness. A PG screen and measures assessing importance, readiness and confidence were also included.	Fifteen identified strategy groupings: cognitive, well-being, consumption control, behavioural substitution, financial management, urge management, self-monitoring, information seeking, spiritual, avoidance, social support, exclusion, planning, feedback, and limit finances. There were differences in the helpfulness of strategies by age and gambling severity. The top five strategies were all used by at least 90% of gamblers, and these strategies were all cognitive in nature.	Interventions for PG should target cognitive, feedback, planning, and urge management strategies.
Rodda et al., 2019 Australia Quality rating: Low	Exploration of the prevalence, reasons for and strategies to address gambling busts.	Survey Assessments at baseline and 4 weeks. EGM gamblers, N=104	Baseline data were collected in the venue, with a 4 week online follow-up survey regarding experiences of passing limits. Screens on expenditure, gambling severity and harms were also completed.	Almost half of participants reported a bust in the past 12 months, ranging from \$20 to \$1500 AUD and this was positively associated with the amount of money spent in the past 30 days, and self-reported greater gambling related harms and greater gambling severity. Reasons for busts included both distal (pre-venue) factors and proximal (inside venue) factors. Bust-prevention strategies identified by participants were both distal (e.g., avoid gambling altogether, leave cards or cash at home, set a time or money limit) and proximal (e.g., walk away when losing and change the manner of gambling).	As busts are relative to a priori limits, gamblers at any level of gambling severity can experience a bust. Repeated busts may be an indicator of loss of control and a progression towards PG. Interventions need to focus on factors that mitigate the risk of a bust (e.g., pre-commitment) and that assist gamblers to stick to their limits all of the time.
Rodda et al., 2019 Australia Quality rating: Low	Exploration of the strategies gamblers use to stick to limits in an EGM venue.	Survey Assessments at baseline and 30-days. EGM players, N=104	Participants were administered a checklist of strategies over a 30-day period. At follow-up participants were asked about strategy recommendations.	Participants used an average of 14 different strategies over the 30-day period. Use only money brought into the venue and only play low denominations were used by 90% of gamblers. Compared to PGs, low risk/no PGs more frequently avoided chasing losses, set cues to keep track of time, used only the money brought into the venue, planned in advance their spending, and also viewed	These recommendations support recent moves in Australia (Victoria) to remove automatic cash machines from EGM venues and therefore increasing the barriers to cash beyond intended limits. For the most part, however, gamblers are unsupported by operators and governments in the implementation of these highly rated strategies.

First author, year, location, Evidence rating	Study aims	Research design, Target group, sample size	Method	Main outcomes	Main finding
				gambling as entertainment. Top strategies for limiting gambling were related to limiting access to money.	
Rodda et al., 2020 Australia Quality rating: High	Investigate the feasibility and impact of an action and coping planning intervention on adherence to expenditure limits.	RCT Intervention (n=91) Assessment only control (n=93)  Assessments at baseline and 30 days.  Gamblers who were intending to set a monetary limit on EGMs, N=184	Participants recruited in the venue. All participants asked to list all their planned strategies, describe their intended actions and readiness to use strategies to limit their gambling that day. Intervention group received a 15 min action and coping planning intervention.	The intervention was feasible in terms of recruitment and willingness of gamblers to engage in a pre-gambling intervention. It did not improve adherence to limits at post or 30-day follow-up assessment. Moderate Risk/PGs in the Intervention group spent less than intended within the venue. Spending intentions were significantly less in the 30 days following intervention as compared to 30 days prior. This reduction was not found for participants in the control group.	A simple brief intervention appears feasible in gambling venues and has an impact on gambling intentions over the short term.
Smith et al., 2019 Australia Quality rating: Low Grey Literature	Examine the harm-reduction impact of time-based access to EGMs, from the perspective of current literature and gamblers.	Mixed Methods.  Workshop, literature review, group discussions with recreational and low-risk gamblers (n=26), in-depth interviews with moderate and PG (n=24), survey  N=312.	Literature was searched to find any existing research on shutdowns and harm minimisation. The survey and focus groups examined gambling behaviours, gambling harm, and perspectives on the shutdown.	The late-night shutdown is likely to impact the people it is meant to, PG as they are more likely to be playing at these times. 68% of gamblers thought it was a good idea. Late at night appears to be the best time to consider a shutdown. Minimum shutdown period of 4 hours seems to be supported by most, PG are much more likely to believe a shorter period is sufficient.	All gamblers believe that a shutdown period that is longer and affects a greater number of people would be more effective in reducing harm, though in reality it seems clear that there would potentially be push-back against this if it started to affect more gamblers, particularly those at lower risk levels. As a result of this venue hopping, it seems that a critical consideration to ensure the success of any shutdown is to maintain a uniform time period – gamblers themselves express that a non-uniform shutdown makes little sense if the aim is to minimise harm.
Tabri et al., 2019 Canada Quality rating: High	Investigate the effectiveness of a limit approaching pop-up message on gambling expenditure using a virtual reality slot machine.	RCT  Limit approaching (70%) and limit reached (n=28) Limit approaching (90%) and limit reached (n=30) Limit reached message only (n=30)	Pre-task gambling screen and financially focused self-concept measure. Participants gambled on a simulated slot machine. Participants were then asked to describe the reason for terminating or continuing.	Players in the experimental condition were more likely to stop playing before reaching their money limit compared to players in the control condition. However, this was observed among players who are low, but not high, in FFS. Unexpectedly, condition (control vs experimental) was unrelated to playing beyond the money limit and FFS did not moderate this relation. Results suggest	Gambling operators can help decrease excessive spending among their players with a slight alteration to their pre-existing monetary limit RG tools.



First author, year, location, Evidence rating	Study aims	Research design, Target group, sample size	Method	Main outcomes	Main finding
		EGM players, N=88		that individual difference factors, like FFS, can undermine the utility of RG tools.	
Theriault, 2018 Canada Quality rating: Low	To examine the types of RG strategies used by older adults and the association between these and PG risk.	Secondary data analysis. Older adults, N=673	Data were taken from three studies using the same measures. PG risk measures, questions on RG strategies and demographic were analysed.	No evidence that RG strategies were related to the risk of PG in older adults was found. The respondents who used these strategies did not have a lower PG risk than did the respondents who did not use the strategies. Further, the number of strategies used did not vary between PG risk categories.	Assuming that all RG strategies are effective for every age demographic is inappropriate. More work is needed to understand not only which RG strategies are used by older adults, but also which strategies can protect against the potential consequences of gambling.
Tong, 2019 Macao Quality rating: Low	Investigation whether cognitive factors account for the difference in adherence to RG practices.	Survey Community sample, N=896	Telephone survey asking respondents about gambling experiences, endorsement and awareness of RG practices, Health belief model factors of RG and PG.	Only 56.1% of the respondents had heard of RG, and there was a positive relation between RG awareness and RG practices. HBM factors were shown to explain one's adherence to RG practices in general but the effectiveness of HBM factors varied across RG practices.	There is a need to target different cognitive beliefs for promoting different RG practices in designing intervention.
Zenker, 2018 Thailand Quality rating: High	Evaluate whether accurate knowledge about prospects of winning reduces lottery participation in rural Thailand.	RCT Treatment (n=49 villages) Control (n =49 villages) Household at baseline, N=874, households at follow-up, N=835.	Intervention was an information treatment that familiarised participants with the probability distribution of the lottery. It took 15 minutes. Lottery knowledge was measured in a baseline survey and immediately following intervention.	Individuals showed a better knowledge of the odds of the lottery after being exposed to an information treatment. This did not translate into a statistically or economically significant reduction in the willingness to pay for lottery tickets of the treatment group compared to the control group.	The demand for lottery tickets in rural Thailand is not very sensitive with respect to improved knowledge. Lottery tickets (and potentially other forms of gambling) should be classed as "entertainment goods."
Zhou, 2019 Canada Quality rating: High	Assess the effectiveness of a gambling prevention program in modifying gambling cognitions and intentions.	RCT – 2 x 3 design. Treatment (GameSense vs. Control) and gambling outcomes (win, lose, break-even).	Intervention involved short education program. Participants completed a questionnaire after the intervention (or no intervention) and then played a gambling game. Measures	Program participants showed increased knowledge about gambling, increased resistance to gambling fallacies, and fewer immediate and future intentions to continue gambling regardless of how much they won or lost, compared to the no-treatment control group.	GameSense may alter gambling cognitions and intentions in those with serious gambling problems. This remains a matter for future research. Future research should also consider using a game more similar to ones found in casinos and include an additional control group such as a reading control.

First author, year, location, Evidence rating	Study aims	Research design, Target group, sample size	Method	Main outcomes	Main finding
		University undergraduates of diverse ethnicities,  N=122	assessing cognitions, and gambling intentions and desires were then completed.		

## Appendix 8. Treatment outcomes and predictors of engagement

First author, year, location	Study aims	Study design and FU period	Participants & sample size	Intervention (duration and content)	Outcomes against measures (tools used and high-level results)	Findings
Archer et al., 2019  UK  Quality rating: Very high	Clarify which treatment components and participant characteristics contribute to rates of identified patient treatment entry.	Systematic review with meta-analysis.	Concerned significant others (CSOs)  N=20 distinct treatments with N= 691 participants	8 – 12 sessions of Community Reinforcement Approach and Family Training (CRAFT), designed to help family understand addiction and communicate with their identified patient (IP).	Meta-analysis found CRAFT to be twice as effective as controls/comparison groups. . Multi-modality treatment, including both individual and group sessions, yielded the highest IP treatment entry rates, with progressively lower rates for individual, group and self-directed workbook modalities.	Just five studies were included that were gambling specific. Meta-analysis with gambling only studies indicated CRAFT was no more effective than controls.
Ashrani et al., 2019  Singapore  Quality rating: Low	Evaluation of the utilisation of a helpline and web chat system.	Secondary data analysis for a period of 12 months.	Gamblers or family that were utilising the service.  N=8556	Helpline and webchat which provides support, education and facilitates access to healthcare.	Profiles of callers, call characteristics and actions taken were descriptively analysed. Gamblers made 85.4% (n=8,010) of the calls to the helpline and 73.3% (n=546) of the Web chats. Enquiries were mostly casino related (92.4%, n=5,739). Approximately 1,827 calls were received per month during the study period and 185 referrals were made to the clinic, 80.5% of whom sought treatment.	The call centres appeared to be a useful service heavily utilised by the public as a source of necessary information regarding gambling-related issues, legal aid and treatment.
Buchner et al., 2019  Germany	Investigation of the viability of an e-mental health program to reach affected significant others of gamblers.	Cross-sectional.	Affected family members (AFMs) of disordered gamblers	E-mental health program. Accessed via a website. Consists of 6 modules.	The numbers of page views, visits and distinct visitors as well as websites visited prior to the project website, search terms used to detect the program, and visit duration was recorded. Most visitors arrived at the website via direct	Promoting programs of this nature are important in order to reach a clientele that has not had prior help and also show that it is a viable way to reach AFMs.

First author, year, location	Study aims	Study design and FU period	Participants & sample size	Intervention (duration and content)	Outcomes against measures (tools used and high-level results)	Findings
Quality rating: Low			N=6357		access. Per month, 16.1 new potential participants registered. The final sample consisted of 126 participants, most of them female, with high daily Internet usage and low use of prior professional support or self-help.	
Cardullo et al., 2019  Italy  Quality rating: Moderate	Clinical changes following Repetitive Transcranial Magnetic Stimulation (rTMS) in gambling and cocaine use.	Pre-post.  30 and 60-day F/U	Patients with comorbid diagnoses of cocaine use disorder and gambling disorder  N=7	Twice-daily rTMS sessions for the first five consecutive days of treatment, followed by twice-daily rTMS sessions once a week over eight weeks.	Gambling severity at baseline ranged from mild to severe. Gambling symptoms significantly improved after treatment. Compared to baseline, consistent significant improvements were observed in craving for cocaine and in negative-affect symptoms.	New insight into rTMS as a therapeutic intervention for reducing both gambling and cocaine use in patients with a dual diagnosis.
Castren et al., 2019  Finland  Quality rating: High	Assess the feasibility of an intranasal naloxone spray to treat GD	RCT  8-week evaluation post-treatment.	Problem gamblers  N= 20	Administer the medication in an as-needed manner up to four times a day.	Group A received 2mg dose, Group B received 4mg dose. Acceptability and feasibility scores were high. Group B used intranasal naloxone more frequently than group A, and consequently used more naloxone. No serious adverse events were reported. The post intervention SOGS scores were lower versus pre intervention scores. Depressive symptoms were reduced during the trial.	Mixed results of intranasal naloxone spray for gambling behaviour (i.e., reduced frequency but not expenditure) and decreased depressive symptoms.
Cunningham et al., 2019  Canada  Quality rating: High	Evaluate the effectiveness of an online intervention for improving gambling outcomes.	RCT  Short-term F/U.	Moderate risk of PG  N= 321	4 self-directed web-based modules, involving self-monitoring feedback and motivational contact. A no-intervention control was used.	While there were reductions in gambling from baseline to follow-up, there was no significant observable impact of the online gambling intervention, as compared to a no intervention control condition.	While the current trial observed no impact of the intervention, replication is merited with a larger sample size, and with participants who are not recruited through a crowdsourcing platform.
Cunningham et al., 2019  Canada	Evaluate the effectiveness of an online intervention with or without	RCT  Short-term F/U.	Moderate risk of PG  N= 214	Gambling only: 4 self-directed web-based modules, involving self-monitoring feedback and	Follow-up rates were poor. While there were significant reductions in gambling and current depression and anxiety, there was no significant difference in	There does not appear to be a benefit to providing access to an additional online mental health intervention to our online gambling

First author, year, location	Study aims	Study design and FU period	Participants & sample size	Intervention (duration and content)	Outcomes against measures (tools used and high-level results)	Findings
Quality rating: High	access to a mental health component.			motivational contact. Gambling plus mental health group: addition of "MoodGYM" available on the same portal.	outcomes between participants receiving the G only versus the G + MH intervention.	intervention, at least among participants who are concerned about their gambling.
Cunningham et al., 2020 Canada Quality rating: High	Explore the impact of adding a brief online intervention for alcohol use to a problem gambling intervention.	RCT Short-term F/U.	Moderate risk or PG N= 282	Gambling only: 4 self-directed web-based modules, involving self-monitoring feedback and motivational contact. Gambling plus alcohol intervention group: addition of a brief personalised feedback report summarizing alcohol use and making normative population comparisons.	Follow-up rates were good. There were significant reductions in gambling across time but no significant differences between those who received the G only or G + A interventions. Further, for those with unhealthy alcohol use, there were no significant reductions in alcohol consumption across time or differences between conditions.	The addition of a brief intervention for unhealthy alcohol use to an online intervention for gambling did not appear to improve either gambling or drinking outcomes among people concerned about their gambling. Further research is merited to examine whether an integrated intervention might result in improved outcomes.
Gannon et al., 2020 Australia Quality rating: Low	Exploration of nature of gambling in rural and remote areas and potential barriers to help-seeking.	Qualitative, interviews.	Help-seeking gamblers N=10	Services providing treatment or support.	Rural gamblers differ from urban gamblers due to limitations in leisure choices in rural areas; the problem of social familiarity in relation to anonymous help-seeking; and the dearth of specialized services.	There is a need to consider the role of rural-specific barriers, motivating and protective factors in developing service delivery models and specialized interventions for PG in rural and remote communities.
Garcia-Caballero et al, 2018 Spain Quality rating: Moderate	Determine the effectiveness of an individual intervention based on Motivational Interviewing (MI) and CBT.	Pre-post Long-term F/U.	Pathological gamblers involved in slot machine or online betting. N= 18	6 months with weekly or bi-weekly 40-minute session. Uses MI to encourage gambling abstinence during phase one. Phase two focuses on maintain abstinence using CBT techniques.	Patients significantly reduced the problems related to gambling behaviour. Significant differences in negative urgency, positive urgency, (lack of) premeditation and (lack of) perseverance for impulsive gamblers. Some aspects of quality of life had improved.	Psychological intervention based on motivational interview and cognitive-behavioural therapy significantly reduces gambling-related behaviour problems and leads to improvements in impulsivity and quality of life.
Goslar et al., 2019	Investigate the efficacy of	Meta-analysis	Disordered gamblers.	Use of pharmacological treatments or combined	Pharmacological treatments were associated with large and medium pre-	More rigorously designed, large-scale randomized controlled trials

First author, year, location	Study aims	Study design and FU period	Participants & sample size	Intervention (duration and content)	Outcomes against measures (tools used and high-level results)	Findings
Austria  Quality rating: Very High	pharmacological treatments for disordered gambling.		N= 39 studies with N= 1340 participants	pharmacological and psychological treatments. Intervention duration ranged from 6-24 sessions.	post reductions in global severity, frequency, and financial loss. The controlled effect sizes for the outcome variables were significantly smaller, but robust for the reduction of global severity at short-term. Of the placebo-controlled studies, results showed that opioid antagonists and mood stabilizers, particularly the glutamatergic agent topiramate combined with a cognitive intervention and lithium for gamblers with bipolar disorders demonstrated promising results.	with extended placebo lead-in periods are necessary. Future studies need to monitor concurrent psychosocial treatments, the type of comorbidity, use equivalent measurement tools, include outcome variables according to the Banff, Alberta Consensus, and provide follow-up data.
Granero et al., 2020  Spain  Quality rating: Moderate	Explore the impact of patients' adherence to guidelines for money control on the effectiveness of a CBT program.	Pre-post.	Patients who have met the DSM-5 criteria for a gambling disorder  N=998	16-week CBT intervention for gambling disorder.	Assessments were made at baseline, during the CBT program and at the end. The risk of dropout during therapy was lower in patients who reported money control. No differences were found for the risk of relapse (defined in this study as the occurrence of gambling episodes during the intervention). At the end of the intervention, patients with money control had lower levels of gambling severity and comorbid psychopathology.	The benefits of money control as a stimulus control during the CBT highlight the need to design intervention programs with reliable adherence strategies addressed to achieve complete abstinence from the gambling activities.
Hodgins et al., 2019  Canada  Quality rating: High	Determine the efficacy of an online self-directed intervention for gambling disorder.	RCT  Medium-term F/U.	Moderate risk or PG  Brief personalised feedback (n = 92) Online intervention (n = 95)  N=187	Control: brief personalised normative feedback on gambling. Intervention: online set of self-assessment activities and behaviour and cognitive strategies for reducing gambling with ongoing access for whole follow-up.	Participants in both conditions showed significant reductions in days of gambling and problem severity but no differences between conditions were found. Lack of previous treatment for gambling and higher baseline self-efficacy predicted fewer days of gambling in both conditions. Self-efficacy increased over time but did not appear to mediate changes in gambling. Participants who were most engaged in the extended online program showed better outcomes.	Future research needs to explore the attractiveness, uptake, and effectiveness of online interventions with and without therapist support to understand their potential role in gambling disorder treatment systems.

First author, year, location	Study aims	Study design and FU period	Participants & sample size	Intervention (duration and content)	Outcomes against measures (tools used and high-level results)	Findings
Itapuisto, 2019 Finland  Quality rating: Low	Exploration of barriers to treatment and the help-seeking process.	Qualitative, interviews.	Problem gamblers attending treatment services  N=12	Participants receiving treatment from a psychiatric clinic, substance abuse treatment centre or crisis centre.	Three help-seekers types were identified: individualistic, multi-problematic and family-centric. Individualistic help-seekers emphasise psychological reasons as the major barriers to treatment but also see themselves as key actors in the help-seeking process. Multi-problematic gamblers have other major problems apart from gambling, and they may feel that gambling, even if problematic, has a positive impact on their lives and hence lack motivation to change. For family-centric help-seekers, the reasons for not seeking help are individualised or are treatment- or cultural-related.	In order to offer more effective help, we should recognise dissimilarities in problem gamblers' experiences of barriers to treatment and in the phases of their help-seeking process.
Jara-Rizzo et al., 2019 Spain  Quality rating: Moderate	Investigation of the predictive value of impulsivity traits and relevant covariates on treatment dropout and adherence.	Pre-post.  Short-term F/U.	Patients in treatment for GD.  N=66	Receiving treatment from a mutual help association in Spain.	24 patients dropped out (DO) and 42 patients remained in therapy (NDO) during the 6-month follow-up period. Analysis of impulsivity subscales suggested prospective differences between DO and NDO, with affect-driven dimensions seemingly driving these differences. Among these, only positive urgency independently predicted a slight increase in the drop-out probability. In the NDO group, a higher degree of adherence to therapy was independently predicted by lower sensation-seeking scores and stronger awareness of gambling-related problems.	The presence of affect-driven impulsivity traits may be dropout predictors in patients with gambling disorder. Awareness of gambling-related problems and lower sensation-seeking enhanced compliance with therapeutic guidelines and instructions.
Jonas et al., 2019 Germany  Quality rating: High	Investigate the efficacy of two online interventions for problem gambling.	RCT  Medium term F/U.	Problem gamblers  Web-based – Check out (CO) (n=54)	Web-based structured intervention offers counselling over a period of up to 50 days. It is based on principles of self-regulation, self-control and Motivational	In comparison to the WL at the 3 months follow-up, participants of CO showed significant improvements with moderate to strong effect sizes in all outcomes. Strongest effects were found in the problem gambling severity, followed by the well-being, the	CO helps treatment-seeking individuals to sustainably reduce their gambling behaviour and to increase their general well-being. Compared to EC, CO seems a better support option, since its effects include a wider range of outcomes.

First author, year, location	Study aims	Study design and FU period	Participants & sample size	Intervention (duration and content)	Outcomes against measures (tools used and high-level results)	Findings
			Email counselling (EC) (n=56) Waitlist control (n=57)  N=167	Interviewing including interactive components. Email counselling was over the same duration, did not include interactive aspects instead focused on steps to cope with PG.	gambling days and the highest stake. Improvements were sustained until last follow-up. Compared to the WL, users of EC had beneficiary results in the problem gambling severity. No significant effect differences were found between CO and EC.	Possible reasons are the more engaging program structure and elements of CO, as well as the closer interaction between client and counsellor.
Kraus et al., 2020  USA  Quality rating: High	Review of placebo controlled RCT's of pharmacological treatments used for GD.	Systematic review	PG  N=19 studies, N=1,268 participants	Pharmacotherapy only trials and combined pharmaco- and psychotherapy trials. Included studies ranged from 8 weeks to 6 month treatment duration.	Few randomized controlled trials have studied pharmacotherapies for gambling disorder. Opioid antagonists like naltrexone showed promise in the pharmacological treatment of gambling disorder. Pharmacotherapy combined with psychotherapy treatments for gambling disorder may provide better rates of patient retention in comparison to pharmacology-only treatments.	Future studies should address gaps relating to considerations of racial, ethnic, gender and other individual differences in clinical studies. Because gambling disorder often co-occurs with other psychiatric disorders, additional research is needed to test treatments for dually diagnosed patients.
Magnusson et al., 2019  Sweden  Quality rating: High	Investigate the effects of an internet-based CBT intervention for significant others of treatment-refusing problem gamblers.	RCT  Medium term F/U.	Concerned significant others (CSOs) of problem gamblers  Treatment (n=51) Waitlist control (n=49)  N=100	Nine modules delivered over 10 weeks. Use of CBT techniques with a focus on engaging the CSO and gamblers in naturally reinforcing activities, both together and alone.	Psychological well-being of the CSOs were improved by intervention compared to the wait-list group at the post-test, relationship satisfaction, anxiety, and depression. However, the effects on the gambling outcomes were small and inconclusive.	Affecting the gambler via a CSO is challenging, but it is possible to increase the CSO's coping and well-being.
Mallorqui-Bague et al., 2018  Spain  Quality rating: Moderate	Explore the associations between trait impulsivity, impulsivity-compulsivity related cognitive domains, and treatment outcomes.	Pre-post.  Short-term F/U	Adult males diagnosed with gambling disorder undergoing CBT.  N=144	CBT at a specialized outpatient service. 16 weekly group sessions.	Trait impulsivity predicted low compliance and relapse at 5 weeks of treatment and dropout at the end of treatment. Cognitive flexibility performance predicted: dropout rates at the end of treatment; dropout and low compliance or relapses at follow-up; and time to first relapse and time to dropout.	Impulsivity and compulsivity levels may influence response to GD treatment (i.e.: low compliance and dropout or relapse rates) thus representing a potential target for improving treatment outcomes.

First author, year, location	Study aims	Study design and FU period	Participants & sample size	Intervention (duration and content)	Outcomes against measures (tools used and high-level results)	Findings
Matheson et al., 2018 Canada Quality rating: High	Examine the literature on interventions for prevention and treatment of PG among older adults.	Systematic review.	Articles on treatment for PG.  N=188 focused on treatment of PG	A range of treatment options identified. CBT, mindfulness, MI and exercise, integration of support for or from family, group therapy, mutual-aid or pharmacological treatments.	Treatment literature is divided into four major sections with a focus on (1) psychosocial treatments and therapies (91 papers), (2) mutual aid (20 papers), (3) pharmacological treatments (56 papers), and (4) women-focused treatment, assessment, and effectiveness issues (46 papers). Only three studies exclusively focused on older adults and 56 studies included older adults in their samples but did not differentiate findings by age.	There is a substantial gap in our knowledge about prevention especially, and treatment approaches for PG that might be effective for older adults. More specifically, there is little research on the senior population despite our knowledge that gambling is a leisure activity of interest to them.
Maynard et al., 2018 USA Quality rating: Very High	Examine the effects of mindfulness-based interventions on gambling behaviour and related outcomes.	Systematic review and meta-analysis	Problem or pathological gamblers.  N=13 studies, with N=463 participants. Meta-analysis, N=7 studies and N=255 participants.	Interventions with a mindfulness component. Most were less than 12 weeks or 12 sessions. Most were individual face-to-face, with one group intervention.	Thirteen studies met criteria for this review and seven met criteria for meta-analysis. Effects were moderate to large for gambling behaviours/symptoms, gambling urges, and financial outcomes. Heterogeneity was low and non-significant.	Mindfulness-based interventions in the treatment of disordered gambling are supported. However, these results are necessarily tentative, limited by the number and quality of eligible studies, and differing conceptualizations of mindfulness.
Mestre-Bach et al., 2019 Spain Quality rating: Moderate	Explore the predictive capacity of DSM-5 symptom severity and impulsivity on response to CBT for gambling disorder.	Longitudinal.  Assessments at 1, 3, 6, 12 and 24 months.	Patients diagnosed with GD from the Department of Psychiatry.  N=398	CBT at a specialized outpatient service. 16 weekly group session.	There were no differences in treatment outcomes between patients categorized by DSM-5 severity levels. Higher baseline scores in negative urgency predicted relapse during CBT treatment, and higher levels of sensation seeking were predictive of drop-out from short-term treatment, as well as of drop-out at 24-months.	The clinical utility of DSM-5 severity categories is questionable and dimensional approaches for gambling disorder are warranted.
Mooney et al., 2019 UK Quality rating: Moderate	Pilot study of a brief relational psychodynamic treatment protocol for patients with comorbidities.	Pre-post.	PGs with other comorbid compulsive addictions who did not respond to CBT.	Psychodynamic treatment over 12 weekly sessions specifically designed for gambling and compulsive addiction.	The psychodynamic addiction model was associated with reduced depression, anxiety, and gambling severity, suggesting that a relational psychodynamic treatment is needed for complex patients with compulsive	The therapeutic relationship is a critical factor in the treatment of patients with compulsive addiction problems.



First author, year, location	Study aims	Study design and FU period	Participants & sample size	Intervention (duration and content)	Outcomes against measures (tools used and high-level results)	Findings
			N=72		addiction, where CBT had not been successful.	
Nilsson et al., 2019 Sweden Quality rating: High	Comparison of the efficacy of behavioural couples therapy (BCT) and CBT for both the gambler and the family.	RCT Medium term F/U.	PG (n=136) and family (n=136) BCT (n=136) CBT (n=136) N=272	10 therapist guided self-help modules delivered online with weekly telephone and email support. In CBT condition only gamblers received modules, whereas both gambler and CSO received modules in the CBT condition.	The outcomes of both gambler groups improved, and differences between the groups were not statistically significant. BCT gamblers began treatment to a higher proportion than CBT gamblers	Differences in the efficacy of internet-based behavioural couples therapy and cognitive behavioural therapy for treatment of problem gambling were not significant, but more gamblers commenced treatment in the behavioural couples therapy group.
Oei et al., 2018 Australia Quality rating: High	Comparison of a self-help CBT program to waitlist control.	RCT 8-week evaluation post-treatment.	PG CBT (n=23) Waitlist (n=32) N=55	Seven sessions completed over 7 weeks of self-help CBT based treatment.	Significant improvements in frequency of gambling, average amount gambled per day and PG symptoms as well as a number of gambling correlates including psychological states (e.g., depression, anxiety and stress), gambling cognitions, gambling urges, gambling related self-efficacy, satisfaction with life, and quality of life among those who completed the CBT program, when compared with the waitlist condition.	A self-help CBT program can be beneficial for treating community problem gamblers.
Penna et al., 2018 Brazil Quality rating: High	Test the effects of exercise for treatment of gambling disorder compared to active control.	RCT 8-week evaluation post-treatment.	PG Exercise (n=32) Active control – stretching (n=27) N=59	Exercise treatment (10-min stretch and 40-min aerobic exercise) consisted of 16, 50-min sessions (twice weekly), with the same number of sessions and amount of time for the stretching control.	An overall time effect on both primary (gambling severity and psychiatric comorbidities) and secondary outcomes (gambling craving) was found. No significant differences were observed between the treatment and control group in gambling severity. Conversely, greater improvements in psychiatric comorbidities were observed for the treatment group.	Exercise may represent a cost-effective and accessible adjunctive intervention in the treatment of co-occurring psychiatric comorbidities among people with GD.
Petra et al., 2020 Canada	Understanding what strategies help family members cope.	Survey.	Community sample of female spouses of people who had problems	Coping strategies.	Withdrawal coping was most helpful, and commonly used. Some engaged coping strategies were unhelpful but frequently used. Coping is complex;	Professionals should empower family members to use strategies helpful to their well-being.

First author, year, location	Study aims	Study design and FU period	Participants & sample size	Intervention (duration and content)	Outcomes against measures (tools used and high-level results)	Findings
Quality rating: Low			with alcohol, drugs, or gambling.  N=211		research is needed into effective coping for differing goals and contexts.	
Pettoruso et al., 2020  Italy  Quality rating: Moderate	Investigate the feasibility of a non-invasive neuromodulation intervention.	Pre-post  Short-term F/U.	PG  N=8	Delivery of Transcranial Magnetic Stimulation (rTMS) for 13 minutes, twice daily, 5 days a week for two weeks. Maintenance F/U phase, twice daily once a week for 3-months.	A 71.2% Gambling Symptom Assessment Scale mean score reduction after 2 weeks of rTMS treatment was found; the days spent gambling decreased from $19.63 \pm 7.96$ to $0.13 \pm 0.35$ days. Clinical improvements were maintained through- out the study period. The lack of a control group limits the interpretation of these results.	rTMS interventions deserve further investigation as a potential treatment for GD. These protocols should be tested in larger randomized controlled studies, to determine the real benefits of neuromodulation in the clinical course of patients with GD.
Pfund et al., 2020  USA  Quality rating: Very High	Examine the relationship between dose and outcome in studies of face-to-face psychological interventions.	Meta-analysis	Studies assessing treatment efficacy.  N=14, N=1,203 participants	Behavioural, motivational, and personalised feedback interventions.	Of the 10 studies reporting the received treatment dose (i.e., the number of sessions that participants attended), the weighted mean dose was 6.8 sessions. Both intended treatment dose and received treatment dose were positively related to outcome at post-treatment: as the number of sessions increased, so too did the magnitude of the between group effect size.	There were an insufficient number of studies reporting outcome at long-term follow up to evaluate the relation between intended dose, received dose, and outcome.
Pfund et al., 2020  USA  Quality rating: High	Investigation of the impact of motivational interviewing (MI) on treatment attendance.	RCT	Treatment seeking gamblers.  N=69.  Letter condition (n=34), no letter condition (n=35)	Mailed letter incorporating MI techniques and addressed outcome expectancies plus a reminder phone call.	Clients who received the letter plus reminder call were more likely to attend the initial session than were clients who received the reminder call only. Clients receiving the letter were also more likely to reschedule their initial session and less likely to not show up than were clients receiving the reminder call only. There was no significant difference in attendance at subsequent sessions.	Mailing a similar letter to prospective clients of psychological treatment for gambling disorder is worthwhile, given the associated ease and low cost.
Quilty et al., 2019  Canada	Evaluate the efficacy of in-person brief interventions for	Systematic review and meta-analysis	Moderate risk or PG	In person psychosocial interventions of brief duration, including motivational interviewing	Brief interventions were associated with a small but statistically significant reduction in gambling behaviour across short-term follow-up periods versus assessment only control. Aggregate	Brief interventions for problem gambling are supported compared to inactive control in the reduction of gambling behaviour; no differences were found across brief versus

First author, year, location	Study aims	Study design and FU period	Participants & sample size	Intervention (duration and content)	Outcomes against measures (tools used and high-level results)	Findings
Quality rating: Very High	reducing gambling behaviour.		N=6 studies, N=841 participants.	personalised feedback and brief advice.	effect sizes for gambling problems and long-term follow-up periods were not statistically significant. Five records compared brief interventions to longer active interventions, no significant differences were found.	longer interventions for both gambling behaviour and problems. Further investigation of the public health impact of these cost-effective interventions is warranted.
Ranta et al., 2019  New Zealand  Quality rating: Moderate	Examine the effect of a brief PG intervention on depression in a help-seeking population.	Pre-post  Long-term F/U	Gamblers seeking help via the national gambling helpline.  N=131	Manualised version of the helpline's brief intervention.	PG severity reduced from a score of 17 at baseline to a score of 7.5 at 36 months. The percentage of participants with depression reduced from 74% at baseline to 41% at 36 months. For both PG and depression, the greatest reduction was in the first 12 months. Reduced PG severity acted to reduce depression and that there was no independent time effect taking place.	A single brief telephone intervention for PG substantially reduced the prevalence of depression.
Riley et al., 2019  Australia  Quality rating: Moderate	Exploration of the effectiveness of Cue Exposure Therapy (CET) to extinguish gambling cue reactivity.	Pre-post	PGs who had pleaded guilty to committing an offense directly related to their gambling problem.  N=20	Cue-reactivity procedures consisted of a relaxation period followed by in-vivo exposure with response prevention in a gambling environment. Gambling urges and heart rate were measured.	Following CET, significant reductions across all dependent variables were observed. The feasibility and acceptability of the use of portable heart rate monitors to observe the extinction of gambling cue-reactivity is supported. Portable heart rate monitors may provide a novel and useful tool for therapists and their PG patients to monitor gambling cue-reactivity during treatment.	Further research is needed to evaluate whether extinction of cue-reactivity can reduce PG relapse.
Roberts et al., 2020  UK  Quality rating: Low	Identify predictors of treatment dropout from a residential treatment facility.	Secondary data analysis	Gamblers seeking treatment.  N=658	Treatment from a residential treatment facility.	51.3% of sample dropped out. Significant predictors included older age, higher levels of education, higher levels of debt, online gambling, gambling on poker, shorter duration of treatment, higher depression, experience of previous treatment programs and medication, and adverse childhood experiences.	Clinicians working in inpatient support need to be aware of the increased psychopathological and psychosocial problems in those who are at risk of termination and make attempts to retain them in treatment and increase patient compliance.
Rodda et al., 2018	Examine the range of help-seeking options used by	Pre-post	Help seeking gamblers.	Participants were receiving help from an online counselling service.	The 14-item HSQ yielded a significantly higher level of lifetime professional help-seeking (70%)	Current measurement of help-seeking appears to underestimate the range of activities currently

First author, year, location	Study aims	Study design and FU period	Participants & sample size	Intervention (duration and content)	Outcomes against measures (tools used and high-level results)	Findings
Australia Quality rating: Moderate	gamblers and determine whether administering a full list yields higher help-seeking rate.		N=277		compared to the one-item measure (22%). When self-directed activities were included, 93% of gamblers reported having used at least one activity to reduce their gambling.	undertaken by gamblers to reduce their gambling.
Rodda et al., 2019 Australia Quality rating: Low	Examination of the type of treatment option preferred by gamblers' family members.	Mixed methods, survey including open-ended questions.	Family member or friend of someone with a gambling problem.  N=62	Treatment options included family-focused or gambler-focused options.	Fifty percent of participants requested gambler-focused options, such as advice and support on getting the gambler to change, supporting behaviour change and facilitating treatment seeking. Family-focused approaches (28%) most frequently focused on improving relationship quality, getting information on support options and help in managing gambling impact. Family members also requested a blended approach (22%) (e.g. how to support the gambler and how to deal with the negative impacts).	Interventions need to be able to accommodate both gambler-focused and family-focused approaches.
Rodda et al., 2019 Australia Quality rating: Low	Explore the experiences and perceptions of therapists supporting guided online CBT.	Qualitative, interviews.	Therapists.  N=7	Therapist provided support for an internet delivered CBT intervention consisting of four modules, each with 13-15 activities.	Five themes identified: participant suitability and screening, program content and modality acceptability, participant information and management, email communication, and ongoing service integration. Overall experiences and perceptions of therapists were positive, notwithstanding barriers concerning assessment of participant suitability, participant management systems and low participant engagement.	Internet-based interventions for PG are beneficial though there are several areas for improvement. Results can inform the development of future treatments to enable flexible tailoring of interventions to individuals.
Sanchez et al., 2019 Canada Quality rating: Low	Explore factors that shape acceptability of internet-based interventions for PG.	Qualitative, focus groups	PGs (n=13) and clinicians (n=21).  N=34	Internet-based interventions (IBIs).	Clinicians were more concerned about issues relating to the dissemination of IBIs into clinical settings, including the development of policies and protocols and the implications of IBIs on the therapeutic relationship. There was consensus among clients and clinicians	Acceptability is an important factor in the overall effectiveness of IBIs. Gaining an understanding of how end users perceive IBIs and why they choose to use IBIs can be instrumental in the successful and

First author, year, location	Study aims	Study design and FU period	Participants & sample size	Intervention (duration and content)	Outcomes against measures (tools used and high-level results)	Findings
					on common factors influencing acceptability: access, usability, high quality technology, privacy and security, and the value of professional guidance.	meaningful design, implementation, and evaluation of IBIs.
Sharman et al., 2019 UK Quality rating: Low	Measure trends and patterns in UK treatment-seeking gambler behaviour and demographics.	Secondary data analysis.	PGs attending a residential facility.  N=768	Residential treatment.	Prevalence of forms of PG have changed over time: Fixed Odds Betting Terminals (FOBTs), sports betting, and poker have become more common; horse and dog racing, and the National Lottery have become less common. Online gambling has also increased over time. In more recent years, gamblers are also more likely to have attempted suicide, to report a co-occurring mental health disorder, and to start treatment having already been prescribed medication.	UK treatment-seeking gambler behaviour has changed over time; major changes relate to the forms of gambling engaged in problematically, and the mental health of disordered gamblers.
So et al., 2020 Japan Quality rating: High	Develop and test a low-dropout unguided intervention integrated with a messaging app.	RCT	Moderate risk or PG  Intervention (n=97) Control (n=101)  N=197	Rule-based chatbot (GAMBOT) received daily monitoring, personalised feedback and private messages for 28 days. Control received biweekly messages for assessment only.	No significant between-group difference in the primary outcome (PG severity) was observed but one was in the secondary outcome (gambling symptoms). 6.7% of participants dropped out during follow-up and 77% of the GAMBOT group participants (74/96) continued to participate in the intervention throughout the 28-day period.	Integrating intervention into a chatbot feature on a frequently used messaging app shows promise in helping to overcome the high dropout rate of unguided internet-delivered interventions. More effective and sophisticated contents delivered by a chatbot should be sought to engage over 90% of problem gamblers who are reluctant to seek face-to-face support.
Van der Maas et al., 2019 Canada Quality rating: Moderate	A scoping review of use of internet interventions of PG treatment and prevention.	Scoping review	Gamblers  N=27, with N=25,265 participants.	Range of interventions, one-on-one counselling, CBT based interventions ranging from 3 weeks to 3 months.	Cognitive behavioural therapy was the most common form of internet-based intervention. Internet-based interventions were generally shown to be effective in reducing problem gambling scores and gambling behaviours. A wide range of interventions that made use of internet resources included text-based interactions with counsellors and peers,	Internet-based interventions are a promising direction for treatment and prevention of problem gambling, particularly in reducing barriers to accessing professional help. The state of the current literature is sparse, and more research is needed for directly comparing internet-based

First author, year, location	Study aims	Study design and FU period	Participants & sample size	Intervention (duration and content)	Outcomes against measures (tools used and high-level results)	Findings
					automated personalized and normative feedback on gambling behaviours, and interactive cognitive behavioural therapies.	interventions and their traditional counterparts.
Van der Tempel et al., 2020 Canada Quality rating: Moderate	Examine the effects of a mindfulness-based intervention in a sample of treatment seeking women.	Pre-post	Treatment-seeking women diagnosed with Gambling Disorder.  N=9	10 weekly sessions of a group mindfulness-based intervention with daily meditative practice.	MBI was associated with clinically and statistically significant decreases in the gambling severity and cravings; decreased depression scores and more consistent attention to negative affective words on an emotional Stroop task. Childhood exposure to violence and paternal over-control were inter-correlated, and each predicted lower distress tolerance.	These preliminary data support the feasibility and therapeutic potential of MBI for women with GD.
Ward et al., 2018 UK Quality rating: Moderate	Investigate the potential indications and adverse effect of the opioid antagonist naltrexone for PGs	Pre-post	PG who had already undergone psychological therapy for PG with limited success.  N=10	Patients were prescribed an initial dose of 25 mg per day for 3 days, and then 50 mg per day as the usual maintenance dose.	Patients showed significant decreases in their craving to gamble and the majority (60%) were able to abstain completely from gambling in the treatment period, with a further 20% reducing their gambling to almost nothing. The reported side effects from the naltrexone included: loss of appetite, gastrointestinal pain, headaches, sedation, dizziness, and vivid dreams. Two patients with concurrent alcohol-use disorder relapsed during the treatment. One patient relapsed after the treatment period.	Gambling cravings saw significant reductions for the sample set. Given the design of the study as a case series, there was no control group, and a number of patients were on other psychotropic medications. We recommend care when prescribing to those suffering from concurrent alcohol-use disorder.
Wieczorek et al., 2020 Poland Quality rating: Low	Explore difficulties in treatment of people with comorbid gambling and alcohol or drug use disorders.	Qualitative, interview.	Patients with diagnosis of comorbidity.  N=65	Receiving both out- or in-patient treatment for alcohol or drug dependence.	Difficulties related to treatment implementation, severity of patients' symptomatology, maintaining abstinence and an escalation of one disorder due to the treatment of a second disorder.	An awareness of the difficulties in treatment of people with comorbid disorders, as experienced by professionals, allows an improvement of the quality of treatment and increases the chance that these patients will receive better help tailored to their needs.
Wittekind et al., 2019	Investigate the feasibility and	RCT	Low, moderate or PG.	The Approach Bias Modification (AppBM)	Attrition was high (66%). Both groups showed similar reduction in gambling-	The high attrition rate indicates that acceptability was rather low and

First author, year, location	Study aims	Study design and FU period	Participants & sample size	Intervention (duration and content)	Outcomes against measures (tools used and high-level results)	Findings
Germany Quality rating: High	effectiveness of a web-based approach-avoidance task for cognitive modification.	8-week evaluation post-treatment.	AppBM intervention (n=66) Sham control (n=65)  N=131	task is training version of the Approach-Avoidance Task designed to train participants to implicitly avoid disorder-related stimuli.	related symptoms. No support for claim that only contingency training yields beneficial effects. However, it cannot be ruled out that effects result from other factors unrelated to training such as expectancy effects.	strongly constrains interpretability of results. Before firm conclusion regarding the effectiveness of AppBM trainings in problem and pathological gambling can be drawn, studies in large, clinical samples are needed.
Zhuang et al., 2018 China Quality rating: Moderate	Evaluation of the short and long terms of a culturally attuned CB group treatment.	Quasi-experimental matched pair design  Short-term F/U.	Moderate risk or PG  Intervention group (n=42) Social activity group (n=42)  N=84	Eight 3-hour weekly sessions of group CBT.	When compared to the social activity group and after controlling for general group effects, there were significantly greater decreases in the severity of gambling, gambling-related cognitions (i.e. interpretive bias), negative psychological states (i.e. stress) and money spent on gambling in the past month in the CBI group between pre- and post-intervention and between pre-intervention and 6-month follow-up.	The culturally attuned integrated CBT group treatment with an emotional regulation component appeared to be effective in treating Chinese problem gamblers in Hong Kong and the effects could be sustained at 6-month follow-up.

#### Appendix 9. Attitudes and behaviours of vulnerable populations

Author, year, location.	Study aims	Research design, participants, sample size	Methods	Main Findings	Conclusions
Adrie et al., 2019 Germany Quality rating: Moderate	Increase knowledge of PG among adolescents in seven European countries and assess the effect of demographic and lifestyle factors.	Survey.  Adolescents attending school in 9th or 10th grade in Germany, Greece, Iceland, The Netherlands, Poland, Romania and Spain,  N=13, 284	Anonymous surveys were completed at school by students, assessing internet usage characteristics, school achievement, parental control, internet addiction and PG.	12.5% of the participants reported last year gambling activities either online or offline. 3.6% of the study participants were at risk or had a gambling problem (higher proportion among males, older age groups, parental educational level was lower/middle, no siblings). Being at risk or having a gambling problem was associated with lower age at first use of the internet, lower school grades, using the internet 6–7 days per week, and problematic internet use. At risk or problem gamblers had higher scores on all scales of problem behaviour and lower	Better gambling legislation is needed and the importance of developing social responsibility tools that may help diminish adolescent gambling involvement, with special attention to males, is highlighted.

Author, year, location.	Study aims	Research design, participants, sample size	Methods	Main Findings	Conclusions
				scores (lower competence) on activities and academic performance.	
Awaworyi et al., 2020  Australia  Quality rating: Low	Examine the impact of ethnic diversity on gambling.	Secondary data analysis.  General population,  N=14,061.	Data were taken from the Household, Income and Labour Dynamics in Australia survey.	Ethnic diversity is positively associated with gambling. This is robust to alternative estimation approaches; alternative ways of measuring ethnic diversity and irrespective of whether gambling is measured using the Problem Gambling Severity Index, gambling expenditures or number of gambling activities. Our results also suggest stronger effects of ethnic diversity for problem gamblers compared to gamblers in other risk categories.	There is a need for policies that promote social capital in diverse communities to reduce the risks of social isolation, which is an important motivator of gambling behaviour.
Banks et al., 2020  UK  Quality rating: High	Review of studies reporting on the prevalence of GD among prisoners across international jurisdictions.	Systematic review.  Studies on prevalence of GD among prisoner populations, N=12 studies with N=3892 participants.	Studies were excluded if they were review articles, they reported on the same prison populations, juvenile offenders, included offenders subject to community sanctions, reported on a sub-set of the population, pre-trial detainees, or there were 50% non-participation.	Between 5.9% and 73% of inmates met diagnostic criteria for problem or pathological gambling. Recorded rates of problem and pathological gambling among inmates are consistently and significantly higher than rates of problem and pathological gambling recorded among the general population.	The institution of problem gambling treatment programs in carceral settings is necessary, in order to aid community re-entry and reduce the likelihood of re-offending. The screening of inmates should become standard practice across penal institutions and other criminal justice organisations, with a view to better addressing the needs of offenders.
Cowlshaw et al., 2020  Australia  Quality rating: Low	Provide data on the frequency and implications of PG among fire-fighters.	Survey.  Career and retained fire-fighters,  N=566.	Members of the South Australian Metropolitan Fire Service (MFS) completed a survey assessing gambling problems, PG severity, depression, anxiety, PTSD, alcohol problems, other addictive behaviours, wellbeing and psychosocial issues.	12.3% of fire-fighters reported gambling problems, including 2.3% that were problems gamblers, and 10.0% reporting at-risk gambling. The weighted prevalence of PG was comparable to other significant mental health conditions including depression and PTSD, while the rate of any gambling problems was high relative to other addictive behaviours. Gambling problems were associated with poor mental health and wellbeing, but not psychosocial indicators (e.g., financial difficulties).	Gambling problems across a spectrum of severity may be significant yet hidden issues among emergency service workers, and thus require increased recognition and responses at the organisational level.
Cox et al., 2020	Investigate speculative trading behaviour and its	Survey.	Data were collected from two different panels of	Another 3.6% meet the criteria for problem gambling, which is a less severe	Future research should shed more light on the causes and consequences



Author, year, location.	Study aims	Research design, participants, sample size	Methods	Main Findings	Conclusions
Denmark  Quality rating: Moderate	relationship with gambling problems.	Sample 1 Dutch retail investors (n=274), and non-investors (n=345), N=619.  Sample 2 Dutch retail investors (n=259) and non-investors (n=607), N=866.	Dutch investors. Survey assessed trading behaviour and related variables such as risk tolerance and financial literacy, financial situation, and gambling.	form of gambling disorder. Investors with symptoms of compulsive gambling problems tend to follow a more active and speculative trading style, indicated by a higher frequency of stock trading, day-trading and investing in derivatives and leveraged products.	of compulsive gambling in the financial markets, a test to what extent gambling-motivated trading is influenced by past gains and losses.
Dowling et al., 2019  Australia  Quality rating: Low	Predict family violence in a sample of treatment-seeking gamblers.	Survey.  Treatment-seeking gamblers,  N=141	Participants completed a survey measuring family violence, gambling indices (gambling symptom severity, gambling time spent, gambling frequency, gambling expenditure), psychological distress, symptoms of PTSD, gambling coping motives, alcohol and drug use, gambling-related legal consequences, work and social adjustment, and impulsivity.	The prevalence of family violence was 25.5%, with 18.4% reporting victimization and 19.1% reporting perpetration. Intimate partners and parents were most likely to be both perpetrators and victims of family violence. Victimization was significantly predicted by psychological distress, symptoms of PTSD, and gambling-related legal consequences, while perpetration was significantly predicted by gambling symptom severity, gambling-related legal consequences, and impulsivity. The association between gambling symptom severity and victimization was significant only for gamblers with low levels of gambling coping motives and moderate or high levels of alcohol use.	Routine screening in problem gambling and family violence services is needed, particularly for those who report gambling-related legal consequences and highlight the need for prevention and intervention programs to lower the co-occurrence of these behaviours.
Dowling et al., 2020  Australia  Quality rating: Moderate	Exploration of the psychosocial factors associated with gambling problems in international and domestic university students in Australia.	Survey.  Domestic University students (n=127), international students (n=45),  N=173.	Participants completed a survey either online or hard-copy assessing gambling participation, PG, psychosocial factors (depression, anxiety, perceived social support, loneliness, gambling-related cognitive distortions) and English language difficulties.	Gambling participation, but not PG status, was lower in international than domestic students. Only anxiety and cognitive distortions were associated with PG in domestic students; and only cognitive distortions were associated with PG in international students. International student status failed to moderate the relationships between any psychosocial factor and PG status.	Future research is required to elucidate PG risk and protective factors in this ethnic minority subgroup, with a view to guide culturally sensitive initiatives.
Economou et al., 2019	Explore gambling prevalence and associated factors, and differences	Survey.	Participants completed either a telephone or patron survey which assessed PG,	2.4% of respondents met criteria for problem gambling. Male gender, minority status, living with family of origin, low	Having started gambling during the recession increased the odds of suffering from problem gambling;

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Greece Quality rating: Low	among gamblers who started gambling prior or during the economic recession in Greece.	General population sample, telephone (n=3404) and patron (n=2400), N=5804.	socioeconomic and demographic variables, and ways of dealing financially with the crisis.	educational level, and low to zero income was found to constitute the risk factors of the disorder.	however, this finding was gender-specific.
Emond et al., 2019 UK Quality rating: Moderate Grey Literature	Describe young people's gambling behaviour and attitudes, and to investigate the antecedents and consequences of at-risk and PG in young adulthood.	Longitudinal research. Young people from the age of 17 through to 24 years. N=3566 at 17 years, N=3940 at 20 years, and N=3841 at 25 years.	Data were collected by a computerised questionnaire, an online questionnaire, and a postal questionnaire. It assessed gambling and related variables.	Although many young people gamble without any harm, a significant minority (mainly males) show problem gambling behaviours which are associated with poor mental health, involvement in crime, and potentially harmful use of drugs and alcohol.	The only activity showing a consistent increase over this age range was online gambling and betting. Patterns of problem/moderate risk gambling were set by the age of 20 years.
Gabrielyan et al., 2020 US Quality rating: Low	Identify the impact of various economic factors on lottery sales by using zip-code level sales within the state of Maine.	Secondary data analysis. Sales data over 5 years (2010-2014), points of sale, N=6,899 (zip codes, N=1,525).	Gross sales over 5 years from draw and instant lotteries were provided by the State of Maine through a Freedom of Access Act request. They were provided for each point of sale (e.g. stores, gas stations).	The results show that an increase of 1% in unemployment rate results in a 0.38% increase in draw lottery sales, but it has no significant impact on instant lottery sales.	This highlights the importance of differentiating between two major types of lotteries.
Gallaway et al., 2019 US Quality rating: Low	Investigate potential problematic gambling and its association with demographics and behavioural characteristics in a US military cohort.	Survey. US military members, N=1553.	Survey was a computer assisted telephone survey. It assessed PG and a number of correlates including psychological variables, legal and financial problems, health and impulsivity.	Results indicated past-year frequent gambling and lifetime potential PG was reported by 13% and 8% of respondents, respectively. PG and past-year gambling behaviours were associated in a dose-response relationship from 18% among soldiers gambling once per week to 44% among those gambling 4 or more times per week. Correlates of screening positive for potential PG included: being male, currently unmarried, having left the Guard or retired, minor depression, alcohol dependence, legal problems, and increased pain.	Given the higher prevalence of frequent gambling in this military cohort (8%), nearly twice the US prevalence (5%), and the association with negative psychological and behavioural outcomes, routine screening of gambling frequency and PG may be needed to ensure military and veteran populations live the healthiest lives possible.

Author, year, location.	Study aims	Research design, participants, sample size	Methods	Main Findings	Conclusions
Gambling Commission, 2018  UK  Quality rating: Low	Annual survey to explore gambling behaviour among young people in Britain.	Survey.  Youth aged 11-16 years old,  N=2,865.	Participants were surveyed as a part of the annual Gambling Commission. The research was conducted in schools with pupils filling out questionnaires or online.	14% of 11-16-year olds had spent their own money on a gambling activity in the week prior to taking part in the study. This is 2 percentage points higher than in 2017 but is still relatively low by historical standards. The survey indicates that 1.7% of 11-16-year olds are problem gamblers, 2.2% are 'at risk' gamblers and 32.5% are non-problem gamblers.	The pattern of young people's participation in different gambling activities remains broadly similar to previous years. Much of the gambling activity among this age group takes place in locations that do not require a gambling premises licence (for example, playing on fruit machines in pubs or private bets at school or at home). Underage gambling activity is less prevalent at licensed premises such as betting shops, bingo halls and casinos.
Granero et al., 2019  Spain  Quality rating: Low	To explore the existence of empirical clusters related to gambling habits in a sample of elderly participants.	Survey.  Adults aged 50-90 years old,  N=361.	Participants were recruited from a gambling treatment facility and an additional non-gambling related medical facility. They completed semi-structured interviews assessing gambling, psychological state, life events and other sociodemographic and socioeconomic factors.	Two clusters were identified: (a) cluster 1 (labelled as "low risk of gambling problems", n=265, 73.4%), which included the higher proportion of non-gamblers, women, widowed, and lower levels of education and (b) cluster 2 (labelled as "higher risk of gambling problems", n=96, 26.6%), which included the higher proportion of men, who reported both non-strategic and strategic gambling preferences, older age, longer history of gambling, higher gambling severity, higher use of substances and worse psychopathological state.	This study identified a phenotype characterized by elderly individuals who, in addition to alcohol and tobacco consumption, emotional distress problems and stressful life-events, presented a greater risk of gambling problems.
Grubbs et al., 2019  US  Quality rating: Moderate	Examine how PTSD might be related to the expression and experience of gambling related cognitions.	Survey.  Inpatient sample of US Armed Forces veterans seeking treatment for GD (n=332), an online sample of recreational gamblers (n=589),  N=921	Participants were recruited from a gambling treatment facility and an additional online source. They completed a survey assessing gambling severity, gambling-related cognitions, PTSD, and neuroticism.	Results consistently revealed that individuals with PTSD or symptoms of PTSD were likely to report greater gambling related cognitions. These findings persisted, even when gambling symptom severity and trait neuroticism were held constant.	PTSD is uniquely associated with greater cognitive distortions and erroneous beliefs about gambling behaviours.
Hakansson et al., 2020	Examine financial debts and PG symptoms in online	Survey.	Participants were recruited from a web panel and	PG was associated with psychological distress, recent online casino gambling,	Regulations in the marketing of online casino gambling, and

Author, year, location.	Study aims	Research design, participants, sample size	Methods	Main Findings	Conclusions
Denmark  Quality rating: Low	gamblers, and how these may be related psychological distress, gambling activities and socio-demographic data.	General population sample,  N=1004.	completed on online survey assessing PG symptoms, psychological distress, gambling activities, history of subjective indebtedness and expected over-indebtedness in the near future.	and recent combined online casino gambling and live sports betting. History of over-indebtedness was associated with recent combined online casino gambling and live sports betting, and expected over-indebtedness was associated with online casino gambling. PG and a history of having borrowed money for gambling were markedly higher in online casino gamblers, compared to subjects not reporting this gambling activity. PG was markedly more common in women but was not associated with gender in the adjusted analysis.	prevention of over-indebtedness in gambling-related borrowing, in consumer credit counselling and in mental health care are needed. In particular, female gender may need to be addressed as a stronger risk factor than previously described.
Jauregui et al., 2019  Spain  Quality rating: Low	Measure the link between gambling motives and vulnerability factors in adolescents.	Survey.  Students,  N=472.	Students were recruited from high schools and vocational education centres (mean age 15.6, SD = 1.33). Participants completed a survey assessing gambling motives, gambling severity, parent and peer attachment, coping strategies, and difficulties in emotion regulation.	Parent and peer attachment correlated with gambling motives, whereas parent attachment predicted gambling motives. Difficulties of emotion regulation correlated with gambling motives, with lack of control standing out as the most significant predictor. Coping strategies also correlated with gambling motives, and maladaptive strategies predicted gambling motives. Gambling motives correlated with gambling severity, with coping and enhancement motives as predictors of gambling severity.	Similar to adult pathological gamblers, the importance of gambling motives to detect profiles of reinforcement sources in gambling disorder and to establish intervention aims has been suggested.
Jun et al., 2019  USA  Quality rating: Moderate	Examine the co-occurrence of adolescent risk factors and later gambling behaviours in emerging adulthood.	Secondary data analysis.  Young adults aged 18-29 years,  N=8,282	Data were obtained from the National Longitudinal Study of Adolescent to Adult Health. The relationship between earlier depressive symptoms, antisocial behaviours, alcohol use, and gambling behaviours at wave III, and later gambling participation and problem gambling	Earlier antisocial behaviours and gambling behaviours increased later risk for gambling participation and problem gambling. Past-year alcohol use and heavy drinking were associated with the increased risk of gambling participation but not problem gambling. Earlier depressive symptoms decreased the risk of gambling participation later among those who endorsed antisocial behaviours.	Emerging adulthood may be a critical developmental period in the development of comorbid conditions of gambling and other risk behaviours. The results contribute evidence supporting the importance of early prevention and intervention for the co-occurrence of gambling and other risk behaviours in emerging adulthood.

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			during wave IV was examined.		
Kaltenegger et al., 2019 Sweden Quality rating: Low	Examine the effects of impulsivity and psychological health on risk gambling and heavy episodic drinking (HED), and whether psychological health functions as a moderator.	Secondary data analysis. Students aged 15-18 years, N=21, 886.	Data were extracted from the Stockholm School Survey (SSS) which is conducted in public and independent schools in Sweden. Survey is a paper questionnaire. Data assessing Impulsivity, psychological problems, risk gambling, HED, and a number of sociodemographic control variables was analysed.	Risk gambling (3.4%) and HED (22.8%) were prevalent among Swedish pupils. Impulsivity and—to a weaker extent—psychological problems as well as several sociodemographic variables were risk factors for risk gambling and HED. Furthermore, psychological problems negatively moderated the association between impulsivity and HED among girls.	Prevention measures should particularly address adolescents exhibiting the mentioned risk factors and aim at reducing psychological problems, but not necessarily target the adolescents showing impulsivity and psychological problems simultaneously.
Kim et al., 2018 Canada Quality rating: Low	Examination of comorbid addictive behaviours in disordered gamblers with psychosis.	Secondary data analysis. Treatment-seeking gamblers, N=349.	Data were collected upon intake into the treatment facility. These data were analysed to test for an association between disordered gambling with psychosis and comorbid addictive behaviours	Twenty-five (7.2%) disordered gamblers met criteria for psychosis. Disordered gamblers with psychosis were no more likely to meet diagnostic criteria for current alcohol/substance use disorder than disordered gamblers without psychosis. However, this dual-disorder population reported greater misuse of shopping, food bingeing, caffeine, and prescription drugs. When controlling for multiple comparisons, binge eating was the only addictive behaviour to remain significant.	A comprehensive assessment of addictive behaviours – specifically food bingeing – in this population may be warranted.
Kotter et al., 2019 Germany Quality rating: Low	Assess the prevalence and temporal relationship of mental health status in a sample of casino self-excluders.	Diagnostic interviews. Casino excluders, N=58.	Participants completed face-to-face diagnostic interviews assessing gambling disorder, mental health history, symptom inventory, help-seeking behaviour and exclusion.	The majority of excluders reported impairments in mental health aspects. About three-quarters met criteria of lifetime gambling disorder, more than half in the last 12 months. Other mental disorders were frequent, especially affective and substance-related disorders and typically preceded the onset of gambling disorder. Six years passed between self-awareness of gambling problems and help-seeking. Two more years passed until exclusion	Frequent mental health problems suggest the need for individually tailored support beyond exclusion programs (e.g. psychotherapy, pharmacotherapy, counselling services). Late help-seeking and exclusion entry claim for improved early detection and intervention concepts that consider underlying mental disorders.

Author, year, location.	Study aims	Research design, participants, sample size	Methods	Main Findings	Conclusions
Lind et al., 2019 Finland Quality rating: Low	Explore the prevalence of PG among Finish prisoners, and look at associations between PG, demographics, substance use, crime-related factors, and PG support preferences.	Survey. Prisoners, N=96	Prisoners from two prisons were recruited and completed a survey assessing gambling problems, behaviour, demographics, substance use, and crime-related factors.	One-year pre-incarceration PG prevalence was 16.3 percent and past-year (while incarcerated) prevalence 15 percent. One-quarter of all participants showed an interest in receiving support by identifying one or more support preferences. The most preferred type of support was group support in its all forms.	Correctional institutions should undertake systematic screening for PG and implement tailored intervention programs for inmates with gambling problems.
Machart et al., 2020 Australia Quality rating: Low	Estimate the proportion of homeless sector clinic attenders who have PG and describe their characteristics.	Survey. Homeless clinic attendees, N=2,388.	Data were collected from consecutive presentations to mental health clinics linked to homeless hostels over a period of 8 years. Participants were asked about PG history, and a number of socio-demographic factors.	12.1% reported PG, mainly on poker machines. Those with PG were more likely to be male, to have been married, employed for more than a year and to have a diagnosis of mood disorder. They were less likely to have a diagnosis of psychosis. However, the combination of psychosis and PG was associated with the likelihood of having their financial affairs placed under the control of the Public Trustee.	Earlier attention to PG might reduce the likelihood of becoming homeless, as well as the need for routine enquiry about gambling behaviour, measures to reduce gambling, including expert counselling, restrictions on the availability of addictive forms of gambling and assisting vulnerable individuals with money management.
MacLean et al., 2019 Australia Quality rating: Low	Description of the gambling experiences of a sample of Aboriginal people.	Qualitative, semi-structured interviews. Aboriginal people, N=50.	Semi-structured interviews were part of two larger studies. As part of one of the samples, 8 young people were included aged 16-25 years. Interview topics included experiences with gambling nature of associated harms, help-seeking, and what needed to be done about harms in this community. Data were analysed using Social Practice Theory.	Gambling held meaning as an opportunity for community gatherings but was also regarded as a cause of domestic violence, conflict, isolation and shame. Materially, the venues that offered gambling were experienced by many Aboriginal people as safe and welcoming, but at the same time gambling produced a damaging affective sense of addiction for some. Gambling was a competency that some people valued and taught to children, but it was also seen as undermining cultural practices. While Aboriginal people were historically denied access to licensed venues offering commercial gambling, many participants now found opportunities to gamble inescapable	There is a need for a multi-faceted response to gambling in Aboriginal communities, which includes harm reduction as well as supply restriction and treatment. Some experiences of gambling related by our participants reflected those reported also by non-Indigenous Australians, while others were differently nuanced.
Maltzahn et al., 2019	Understand the complex benefits and harms associated with bingo	Qualitative, semi-structured interviews.	A convenience sample of Aboriginal people from Sunraysia participated in	Bingo was variously a site that reinforces social connectedness, a source of fun and excitement and a strategy to find solace or	We argue for enhanced regulation of commercial bingo and suggest that not-for-profit bingo be implemented

Author, year, location.	Study aims	Research design, participants, sample size	Methods	Main Findings	Conclusions
Australia Quality rating: Low	playing for Aboriginal people in Sunraysia, a regional community in Victoria, Australia.	Aboriginal people, N=26.	semi-structured interviews exploring gambling experience, including questions on bingo and associated harms.	respite in the face of personal pain and structural injustice. In contrast with other forms of gambling, bingo presents risks that can generally be managed, largely because of the smaller financial spend involved. However, people also described harms including exhausting the family budget, family conflict and encouragement to commence other forms of gambling.	as a harm reduction strategy to enable people to experience some of the pleasures associated with gambling, with reduced risk of financial and social harms.
Martinez-Loredo et al., 2019 Spain Quality rating: Low	Identify the subpopulations of adolescents using different substances and gambling activities and explore gender differences and impulsivity.	Survey. Community based sample of adolescents, N=1,644.	Participants were recruited from 22 high schools in six different cities/towns. The survey assessed alcohol, tobacco and cannabis use, gambling behaviour, PG and impulsivity.	Based on a latent class model of drugs and gambling activities, four subpopulations of males and five of females were found. General impulsivity and sensation seeking were the most consistent predictors of class membership.	There is a need to consider specific groups of adolescents engaging in different patterns of addictive behaviours when implementing selective prevention strategies.
Matheson et al., 2018 Canada Quality rating: Moderate	Examine the literature on interventions for prevention and treatment of PG among older adults.	Scoping Review. Articles on treatment for PG, N=188.	A range of treatment options identified. CBT, mindfulness, MI and exercise, integration of support for or from family, Group therapy, mutual-aid or pharmacological treatments.	Treatment literature is divided into four major sections with a focus on (1) psychosocial treatments and therapies (91 papers), (2) mutual aid (20 papers), (3) pharmacological treatments (56 papers), and (4) women-focused treatment, assessment, and effectiveness issues (46 papers). Only three studies exclusively focused on older adults and 56 studies included older adults in their samples but did not differentiate findings by age.	There is a gap in our knowledge about prevention and treatment approaches for PG that might be effective for older adults. There is little research on the senior population despite our knowledge that gambling is a leisure activity of interest to them.
Milton et al., 2019 Australia Quality rating: Moderate	Examine the presentation of gambling, including frequency, thoughts on reducing, and recommendations from others to reduce among a sample of ex-serving military personnel	Secondary data analysis. Active military (n=344), military veterans (n=411) and general population (n=9998),	Data were extracted from the Global Health & Wellbeing Survey, an online self-report survey conducted in Australia, Canada, New Zealand, the United Kingdom and the United States. Four items measuring gambling	A higher proportion of gambling behaviours were observed in both current and ex-serving military samples, compared to the general population. Significant associations were found between the different gambling items and all psychosocial risk and protective factors in the general population sample. However, the military sample yielded only	It is recommended that routine screening tools identifying problem gambling are used within the military, and subsequent resilience focused interventions are offered to at risk personnel.

Author, year, location.	Study aims	Research design, participants, sample size	Methods	Main Findings	Conclusions
	compared to the general population.	N=10,753.	included incidence during the past 12 months; gambling frequency; desire to cut down; and, social or professional encouragement to stop.	one significant association between gambling frequency and the protective factor 'resilience'.	
Mond et al., 2019 Australia Quality rating: Moderate	Examine gambling behaviour, PG and reasons for gambling among international students.	Survey. International students (n=382) and domestic students (n=1013), N=1395.	Students were recruited via email and other social media or on campus methods. Survey assessed gambling, PG behaviour and reasons for gambling.	Most forms of gambling assessed were less common among international students; however, rates of PG were higher among international students (2.6%) than among domestic (1.4%) students. No sex difference in PG among domestic students, whereas PG among international students was confined to males (5%). International students were more likely to report engaging in gambling as a means of regulating their internal states and for a challenge and these and other reasons for gambling were positively correlated with PG behaviour.	There is a need for population- and campus-based health promotion and early intervention programs targeting international students, male students in particular. Information concerning individuals' reasons for gambling might be included in these programs.
Richard et al., 2019 USA Quality rating: Low	Explore the relationship between types and patterns of gambling with stimulant drugs.	Secondary data analysis. High school students aged 12-19 years, N=6, 542.	Data were from the Alcohol, Drug Addiction and Mental Health Services (ADAMHS) Board/Wood County Education Service Centre Survey on Alcohol and Other Drug Use. Stimulant use and gambling behaviour for 11 different gambling activities was assessed.	Self- reported use of crack cocaine was associated with a higher risk of frequent gambling and use of methamphetamines was associated with a higher risk of at-risk/problem gambling. Individuals using stimulants six or more times in the past year had high likelihoods of frequent and at-risk/problem gambling behaviours.	The results contribute to our understanding of stimulant drug use and its associations with gambling behaviours among high-school youth.
Rider et al., 2019 USA Quality rating: Moderate	Compare the prevalence of gambling behaviours and PG among Transgender (TGD) / Gender diverse and Cisgender adolescents.	Secondary data analysis. 9th and 11th grad students, Cisgender (n=78,761), Transgender (n=2,168),	Data came from the Minnesota Student survey. The survey assessed gambling behaviours, PG and a number of sociodemographic factors.	In comparisons by birth-assigned sex, TGD youth assigned male at birth were particularly at risk for gambling involvement and problem gambling. TGD youth assigned female at birth also reported higher rates of problem gambling than both cisgender youth assigned male and female at birth.	Examining rates of gambling behaviour and problem gambling as well as identifying disparities in vulnerable youth populations is crucial in order to develop culturally responsive and gender inclusive prevention, intervention, and outreach programs.



Author, year, location.	Study aims	Research design, participants, sample size	Methods	Main Findings	Conclusions
		N=80,929.			
Roberts et al., 2019 UK Quality rating: Low	Examination of the co-occurrence of Intimate Partner Violence (IPV) and GD among a sample of treatment-seeking gamblers.	Secondary data analysis.  Treatment-seeking gamblers,  N=204.	Data were collected from individuals seeking treatment at the National Problem Gambling Clinic. This included data related to both PG and IPV.	20.1% of participants reported any IPV in the past year; 12.3% reported perpetration and 14.1% reported victimisation in the past year. Clinical scores were greater among patients disclosing IPV; higher anxiety and depression scores coupled with victimisation, alongside greater PG severity; age, anxiety, depression and debt scores among those reporting IPV perpetration.	There is need for enhanced vigilance and first-line responses to IPV in problem gambling treatment services. There is also a need for professional support for the clinicians working with these clients.
Savolainen et al., 2019 USA Quality rating: Moderate	Examination of how social identification with online and offline peer groups associates with youth PG behaviour and the role of social support.	Survey.  Youth sample aged 15 to 25 years from the US (n=1212) and Finland (n=1200),  N=2412.	Online survey Assessing PG and peer group identification, perceived social support.	Youth who identify strongly with offline peer groups were less likely to engage in problem gambling, while strong identification with online peer groups had the opposite effect. The associations between social identification and problem gambling behaviour were moderated by perceived social support.	Online peer groups may be a determinant in youth problem gambling. Focusing on offline peer groups and increasing social support can hold significant potential in youth gambling prevention.
Sharman et al., 2019 UK Quality rating: High	Exploration of gambling risk factors across vulnerable populations.	Systematic review.  N=257 articles.	Studies were included if they have a focus on risk factors in seven vulnerable groups. Young people and Adolescents, older adults, women, veterans, indigenous peoples, prisoners, and low socio-economic/income groups. A narrative synthesis was completed.	Multiple risk factors associated with PG were identified; some appeared consistently across most groups, including being male, co-morbid mental and Physical health conditions, substance use disorders, accessibility and availability of gambling, form and mode of gambling, and experience of trauma. Further risk factors were identified that were specific to each vulnerable group	Although some risk factors are consistent across groups, some risk factors appear to be group specific. There is no homogenous pathway to PG, and social, developmental, environmental and demographic characteristics can all interact to influence an individual's relationship with gambling.
Smith et al., 2019 New Zealand Quality rating: Moderate	Determine the nature and extent of children's everyday exposure to gambling and its marketing.	Content analysis.  Children aged 11-13 years,  N=167.	New Zealand children wore wearable cameras, capturing images of their day every seven seconds for four days, June 2014–July 2015. Images (n=380,000) were assessed for their exposure to gambling and its marketing.	On average, children were exposed to gambling products or activities 0.6 times/day and marketing 6.9 times/day. Marketing exposures occurred most frequently in bookstores (1.7/day), convenience stores (1.5/day), and supermarkets (1.4/day), via a shop front signage (3.3/day) and in-store marketing (1.9/day). The national lottery (4.7/day)	Children were frequently exposed to gambling and its marketing in the everyday places they go. Regulation of gambling and its marketing could contribute to the reduction of gambling-related harm, improving children's health, and well-being.

Author, year, location.	Study aims	Research design, participants, sample size	Methods	Main Findings	Conclusions
				and scratch cards (0.6/day) were most frequently promoted.	
Swanton et al., 2019  Australia  Quality rating: Moderate	Explore the role of financial institutions in gambling with the aim of considering ways in which policies and practices could enhance customer well-being.	Scoping review	Review of the literature.	Limited evidence was found of gambling-specific bank policies despite increasing recognition of the impact of gambling-related harms. Behavioural economics and psychological approaches may be promising frameworks to guide the development of policies to assist customers in limiting their gambling to affordable levels. Financial institutions could implement products and resources for customers to enhance management of gambling expenditure.	Government and community scrutiny over the role of financial institutions in gambling will likely increase given growing recognition of harms. A proactive effort to enhance customer well-being could have broad positive outcomes for financial institutions' social licence to operate.
Swanton et al., 2020  Australia  Quality rating: Low	An exploration of research focusing on gambling-related consumer credit use and debt problems.	Brief review.  N=86 studies.	Database search of literature with a focus on gambling and debt followed by a qualitative synthesis.	Consumer credit use and debt problems increase with problem gambling severity, and increase the likelihood of experiencing poor psychosocial functioning, including psychological distress, substance use, adverse family impacts, crime, and suicidality. Communities and governments are calling for more socially responsible conduct by financial institutions, which increasingly recognise the potentially harmful impacts of credit provision on the well-being of customers experiencing gambling problems.	Policies and interventions are needed relating to consumer credit, debt, and gambling to enhance customers' financial and psychosocial well-being.
Van der Maas et al., 2018  Canada  Quality rating: Low	Increase understanding of gambling and PG among older adults.	Secondary data analysis.  Older adults aged 55 years and older,  N=2187.	Data came from a survey of gambling habits of older adults conducted using a random residential household telephone survey method.	1.8% of the population over the age 55 were classified as experiencing moderate-to-severe problem gambling. While differences across sex were observed in types of gambling, attitudes towards gambling, and frequency of gambling, no significance difference in problem gambling was observed.	Sex differences in gambling participation and moderate to-severe problem gambling are less pronounced among older adults and may be driven by more equal regular gambling participation in comparison to younger cohorts. These findings may provide important implications for how gambling is both regulated and marketed to older adults.
Vitaro et al., 2019	Clarify and unravel both the direction and details of	Secondary data analysis.	Data were obtained from a larger longitudinal	Results showed concurrent associations between substance use and gambling	Substance use and gambling participation share a common genetic

Author, year, location.	Study aims	Research design, participants, sample size	Methods	Main Findings	Conclusions
Canada  Quality rating: Moderate	the relationship between substance use and gambling participation over time.	Youth (from ages 17 to 19),  N=373 twins.	population study of twins. The data used examined the associated between substance use and gambling participation at the ages 17 and 19, the stability of the behaviour and possible cross-time/cross-behaviour associations.	participation as well as a small, but significant unidirectional longitudinal association over time from substance use to gambling participation. Common genetic factors largely accounted for the concurrent associations at Ages 17 and 19, as well as for the unidirectional longitudinal association between substance use and gambling participation.	component that account for most of their concurrent and longitudinal links during late adolescence. However, these behaviours are also influenced by specific environmental factors.
Wardle et al., 2019  UK  Quality rating: Moderate	Exploring perceptions, experiences and determinants of youth gambling.	Rapid review of qualitative evidence.  N=21 articles, including N=16 unique studies.	Rapid review of qualitative research including peer-reviewed studies that explored youth experiences or perceptions of gambling. Narrative and thematic synthesis was completed.	Young people's perceptions of gambling differ from legal and legislative definitions, which risks underestimating the nature and extent of youth gambling behaviour. There are also notable gaps in knowledge, specifically around the role of technology in shaping gambling behaviours beyond consideration of access and availability	There is a pressing need to better understand the whole techno-ecosystem in which gambling is situated and young people's relationship with it to understand youth gambling.
Wardle et al., 2019  UK  Quality rating: Moderate	Examination of literature focusing on the extent to which migrants participate in gambling, the reasons and motivations for participation and experiences of harm.	Rapid review.  N=38 studies.	Rapid review of international scientific and grey literature on migrants gambling and gambling harms, and support options.	Migrants gamble to relieve the stress from moving to a new country. Migrants may be exposed to more gambling advertising and have easier access to gambling compared to when they were in their home country. Some protective factors may prevent gambling participation among migrants. These factors include religious and moral beliefs. The review suggests that migrants experience similar harms from gambling as non-migrants. There are specific barriers that may prevent migrant gamblers from seeking help. The second theme highlights ways to improve gambling support services for migrants.	There is limited data about gambling-related harms and recent migrants. This is particularly problematic given the evidence found here in support of a "harm paradox" – fewer migrants participate in gambling, but those who do are more likely to be affected by harms. Better understanding and evidence are required about the culturally specific and locally contextualised harms migrants experience from their problem gambling.
Zhai et al., 2020  USA  Quality rating: Low	Examine the link between history of gambling, and substance- use and violence-related measures in male and female adolescents.	Secondary data analysis.  9th to 12th grade students,  N=2,425.	Data were from the Youth Risk Behaviour Surveillance. The survey assessed gambling status, substance use and violence related measure in adolescents.	Among students, 18.6% reported gambling. Reported gambling in males and females associated with lifetime use of any drugs, in addition to past-30-days cigarette smoking, alcohol and heavy alcohol drinking, and marijuana use. Gambling associated with reported	Gambling in adolescence was similarly linked to risk behaviours involving substance-use in males and females, though gambling relationships with different violence-measures varied between genders. Assessing gambling behaviour may

Author, year, location.	Study aims	Research design, participants, sample size	Methods	Main Findings	Conclusions
				weapon-carrying, being threatened or injured with a weapon, forced sexual intercourse, bullying, and electronic bullying in males; physical dating violence in females; and physical fighting and sexual dating violence in both groups.	be important for targeted preventions focused on adolescents at risk for substance-use disorder and physical violence.

#### Appendix 10. Emerging technology and trends

Author, year, location	Study aims	Research design, sample, emerging tech focus	Methods	Main findings	Conclusions
Brady et al., 2019 Ireland Quality rating: Moderate	Analysing the physiological response to opening loot boxes to explore links with addiction.	Within-participants experimental design.  Experienced gamers, N=25.  Loot boxes.	Participant's heart rate (HR) and galvanic skin response (GSR) was measured while they were gaming. There were two time points of interest, baseline and while opening a loot box (performing a micro transaction).	GSR increased from baseline. HR decreased while performing a micro transaction. There was a negative correlation between gaming addiction scores and participants' physiological arousal.	The increases in arousal suggest micro transactions in gaming could potentially lead to problematic levels of use, while hyposensitivity could explain the higher gaming addiction relating to lower arousal during gameplay.
Brooks et al., 2019 Canada Quality rating: Low	Exploration of the relationship between gaming involvement, engagement with loot boxes, and their associations with disordered gambling.	Online survey.  Two samples, adults (N=133), and undergraduates (N=133).  Loot boxes.	Online questionnaires were completed by participants regarding gaming and loot-box related variables, including expenditure (time, money), an internet gaming severity scale, and perceptions and behaviours.	Most participants thought loot boxes were a form of gambling (68.1% & 86.2%). Items indexing problematic aspects of loot box use (risky loot box use) were associated with PG severity and gambling related cognitions in the adult sample. Overall, gambling-related variables predicted 37.1% of the variance in risky loot box scores. Findings were replicated, though attenuated, in sample 2.	In addition to the surface similarity of loot boxes to gambling, loot box engagement is correlated with gambling beliefs and problematic gambling behaviour in adult gamers.
Delfabbro et al., 2019 Australia	Explore the importance of considering the interplay between EGM play parameters and psychological needs of	Conceptual review.  EGM play.	An analysis of existing work exploring gambling machine features and then secondly the introduction of a	Existing methods based on the modification of single features are going to be limited and that differences in observed behaviour may relate to measurable differences in motivational states before and during gambling sessions.	A more dynamic and interactive approach to studying EGMs could be facilitated by innovations in Big Data and greater access to genuine player data. Such work may help to inform in situ research methods as well as clinical

Author, year, location	Study aims	Research design, sample, emerging tech focus	Methods	Main findings	Conclusions
Quality rating: Low	gamblers and its impact on EGM related research.		framework for understanding behavioural dynamics.		interventions for gamblers at risk or those already involved in interventions involving exposure and controlled gambling.
Deng et al., 2019  Canada  Quality rating: Low	Review of research testing behavioural variables against indicators of disordered gambling and the potential utility of machine learning algorithms in this area.	Non-systematic literature review.  Online gambling and machine learning to detect disordered gamblers.	Literature review	Disordered online gambling is associated with a range of behavioural variables, as well as other predictors including demographic and payment-related information. Machine learning is ideally suited to the task of combining these predictors in risk identification, although current research has yielded mixed success. Recent work enhancing the temporal resolution of behavioural analysis to characterize bet-by-bet changes may identify novel predictors of loss chasing.	Data science has considerable potential to identify high-risk online gambling, informed by principles of behavioural analysis. Identification may enable targeting of interventions to users who are most at risk.
Drummond et al., 2020  New Zealand  Quality rating: Low	A cross-national investigation of the association between problem gambling, excessive gaming, distress and spending on loot boxes.	Survey.  Three national samples, Australia (n=339), New Zealand (n=323) and the United States (n =387), N=1049.  Loot boxes.	Participants answered an online survey assessing PG, problem gaming symptomology, and how much they spent on loot boxes per month.	On average, individuals with problem gambling issues spent approximately \$13 USD per month more on loot boxes than those with no such symptoms. Loot box spending was also associated with both positive and negative moods, albeit with small effect sizes. Analyses showed both interactions and correlations between problematic gambling and problematic gaming symptoms, indicating both some commonality in the mechanisms underlying, and independent contributions made by, these proposed diagnostic criteria.	These results provide context for dialogues regarding how best to reduce the impacts of loot box spending among those with problematic gambling symptoms.
Edson et al., 2020  US  Quality rating: Moderate	Examine the longitudinal playing trends among daily fantasy sports players and the applicability of a model of exposure and adaptation.	Longitudinal analysis over 27-months.  Fantasy sports players, N=11, 388.  Fantasy sports betting.	Random sample of fantasy sports players were followed for 27 months. Overall levels of engagement were tracked, including total contest entries, fees, and total participation. Daily and month trends were analysed.	We observed increasing engagement over time among a minority of the most involved players (i.e., the top 1% of players on each engagement metric). Less involved players, who comprised the majority of the player pool, tended to exhibit elevated initial engagement followed by decreasing engagement over time. Aggregate playing trends for all groups of players were seasonal, with	Models of exposure and adaptation, in addition to characterizing the population trends of online gambling activities such as online sports betting, likewise can help to explain population trends of most daily fantasy sports players.

Author, year, location	Study aims	Research design, sample, emerging tech focus	Methods	Main findings	Conclusions
				more engagement during National Football League seasons and less engagement during off seasons.	
Gainsbury et al., 2019 Australia Quality rating: Low	Isolate the relationship between specific gambling activities and modalities (Internet and venue/land-based) to gambling disorder and general psychological distress.	Survey. Internet gamblers, N=998. Internet gambling.	Participants completed an online survey assessing PG severity, gambling behaviours, attitudes towards online gambling sites, motivations for using online gambling and psychological harms.	When controlling for overall gambling frequency, problem gambling was significantly positively associated with the frequency of online and venue-based gambling using electronic gaming machines (EGMs) and venue-based sports betting. Psychological distress was uniquely associated with higher frequency of venue gambling using EGMs, sports betting, and casino card/table games.	Among Internet gamblers, online and land-based EGMs are strongly associated with gambling disorder severity. High overall gambling engagement is an important predictor of gambling-related harms, nonetheless, venue-based EGMs, sports betting and casinos warrant specific attention to address gambling-related harms and psychological distress among gamblers.
Karlsson et al., 2019 Sweden Quality rating: Low	Investigate whether signs of problem gaming and problematic internet use are related to PG in the general population.	Survey. General population, N=1,593. Internet gaming and use.	Participants completed an online survey assessing PG, gaming, internet use and other potential correlates.	Associations were found between problem gambling and both problem gaming and problematic internet use, and with male gender. In logistic regression, problem gaming, problematic internet use, and male gender remained associated with problem gambling.	After controlling for potential demographic risk factors, problem gaming and problematic internet use may be related to problem gambling, suggesting that these constructs may interact or may share similar risk factors. More research is needed to clarify factors mediating the links between these conditions.
King et al., 2019 Australia Quality rating: Low	Exploration of potential social responsibility measure for monetised gaming products.	Non-systematic literature review. Loot boxes.	Literature review	We outline some potential measures in the areas of: (1) game design and in-game purchasing system characteristics, (2) transparency and accuracy of game design and features, (3) broad consumer protection measures, and (4) consumer information and industry accountability.	This paper has provided a preliminary blueprint on which to base further discussions of social responsibility in relation to video game monetization. It was evident from these discussions that more research is needed to understand the financial aspects of online games and their relationship to persistent play and the onset of problematic gaming.
Kristiansen et al., 2020 Denmark Quality rating: Low	Examination of loot box engagement patterns and links with PG severity.	Survey. Adolescents, N=1,137. Loot boxes.	Participants completed an online survey assessing monetary gambling involvement, simulated gambling involvement, self-evaluated exposure from gambling advertisements, and a	Nearly half of the participants that were involved in gaming in the past year engaged with loot boxes, and loot box users were predominantly male. The majority of the males (93%) had earned, bought, or sold items from a loot box whereas 15% of the females reported engagement. There was a significant positive correlation between loot box	New insights into the links between loot box engagement and problem gambling among adolescent populations are provided. Specifically, the study provides new knowledge on different engagement patterns among loot box users and their implications. On this basis, different measures to reduce loot

Author, year, location	Study aims	Research design, sample, emerging tech focus	Methods	Main findings	Conclusions
			subsection on gambling related gaming including loot boxes.	engagement and problem gambling severity when controlling for core demographic factors. Compared to participants with no engagement or participants who solely obtained a loot box, the proportions of at-risk and problem gamblers were higher among those, who had purchased or sold items from a loot box.	box purchases and reduce marketplace structures are discussed.
Lawn et al., 2020 Australia Quality rating: Moderate	Conduct a review of the literature and gap analysis of emerging technologies and new trends in gambling.	Rapid review. Peer-reviewed literature published since 2015, N=116. Emerging technologies.	Systematic search of the literature, summary of existing research, identification of gaps within and across the research, a consultation with subject experts to identify further gaps and finalisation and prioritise gaps. Papers were excluded if the focus was on new technologies and trends in the treatment for PG.	The main area of focus was Internet gambling, followed by articles exploring the relationship between video gaming and gambling, the expansion of the sports betting market, Electronic Gambling Machines characteristics and articles exploring new technologies and trends in advertising and inducements. Key gaps related to the need for more research in general, as well as research focusing on subpopulations such as those using different gambling formats, those with varying levels of problem gambling, and vulnerable populations.	Researchers saw the need for longitudinal studies, more qualitative research and improved outcome measures. The development and testing of a public health approach to addressing the harms associated with gambling in these areas is needed.
Li et al., 2019 USA Quality rating: Low	Investigate the relationship between loot box purchases and problem video gaming and PG severity.	Survey. Adult video gamers, N=618. Loot boxes.	Participants completed and online survey assessing PG severity, problem gaming severity, loot box purchases, video game and online gambling engagement, and mental distress.	Nearly half of the sample spent money on loot box purchases in the past year. Loot box purchasers played video games and gambled online more frequently, reported more extended gaming and online gambling sessions, and endorsed higher levels of problem video gaming and problem gambling severity as well as greater mental distress relative to those who did not buy loot boxes.	Insight into the role of loot box purchasing in the transition from recreational engagement in video gaming and online gambling to problem video gaming and/or problem gambling is provided.
Lopez-Gonzalez et al., 2019 Australia	Examine a sample of Australian and Spanish weekly sports bettors to assess their similarities and differences across a range of gambling-related variables.	Survey. General population sample, Australia (n=738), Spanish (n=361)	Participants completed an online survey assessing frequency of channels and devices used for gambling, in-play betting and PG severity.	High problem gambling scores were found among sports bettors in both countries, and consistent similarities in the association between problem gambling, in-play betting, and offline betting. Also, clear trends were observed between problem gambling, higher educational level, and	Recognition of a common pattern of risk factors for problematic sports betting and can help to inform worldwide regulatory efforts to tackle harmful sports betting-specific features such as in-play betting.

Author, year, location	Study aims	Research design, sample, emerging tech focus	Methods	Main findings	Conclusions
Quality rating: Moderate		N=1099.  Online betting.		female sport betting, particularly in the Australian sample.	
Macey et al., 2019  Finland  Quality rating: Low	Assessment of participation rates and characteristics of eSports spectators who gamble.	Survey.  General population sample, N=582.  eSports betting and loot boxes.	Participants completed an online survey assessing PG severity, gambling behaviour including online, offline, eSports and loot box purchases.	The sample highlighted the prevalence of young, often under-age, males in eSports related gambling activities. Participation in gambling, and gambling-like activities, was found to be 67%, with rates of problematic and potentially problematic gambling in the sample being 50.34%. Finally, increased gambling is associated with increased spectating of eSports.	Although the results are not generalisable to the wider population, they suggest a need for increased attention, from academia and regulators, regarding newly emergent gambling behaviours in contemporary digital culture.
Mills et al., 2019  USA  Quality rating: Low	Exploration of the psychological harms associated with crypto trading frequency.	Survey.  Adults who had gambled at least monthly in the past year,  N=876.  Cryptocurrency trading.	Participants completed an online survey which assessed PG severity, health, anxiety, and engagement in gambling related activities including crypto and high-risk stock trading.	Sports betting, daily fantasy sports, high-risk stock trading, and problem gambling severity contribute to trading cryptocurrencies more frequently in the past year, whereas gambling in on-land casinos contributed to less cryptocurrency trading. Finally, trading cryptocurrencies overlapped strongly with trading high-risk stocks. Gamblers who engaged in both forms of trading reported greater problem gambling and depression and anxiety symptoms relative to those trading either cryptocurrencies or high-risk stocks, but not both.	Trading cryptocurrencies may be appealing to gamblers that are exhibiting greater problem gambling severity. Future research should begin to include cryptocurrency trading in screening, assessment, and treatment protocols, particularly with regular gamblers.
Molde et al., 2019  Norway  Quality rating: Moderate	Explore of a directional relationship between problem gaming and PG.	Longitudinal panel survey at two time points over 2 years.  General population survey,  N=4601.  Gaming.	Participants completed a postal survey assessing gaming addiction and the extent of gambling problems.	We found a positive relationship between scores on problematic gaming and later scores on problematic gambling, whereas we found no evidence of the reverse relationship. Hence, video gaming problems appear to be gateway behaviour to problematic gambling behaviour.	The level of problem gaming is associated with a subsequent level of problem gambling, with the known caveat that much of the observed variation occurred on the lower end of both measures. Whether or not problem gamers as a category are at increased risk of developing subsequent problem gambling is a question that should be addressed in future research.
Nelson et al., 2019	Examine of patterns of daily fantasy sport play and its	Secondary data analysis.	De-identified player data were provided by an online fantasy sports	Players entered a median of two contests per entry day and typically submitted a single entry for each contest they entered.	Most DFS players engage in an arguably moderate pattern of play. Nevertheless, there are players who are very involved



Author, year, location	Study aims	Research design, sample, emerging tech focus	Methods	Main findings	Conclusions
USA  Quality rating: Moderate	relationship with excessive play and harm.	Online daily fantasy sport players,  N=10,385.  Fantasy sports play.	operator. Data included player information, monetary transactions, player contest entries, and information about contest structures and pay-outs.	Players paid a median of \$87 in entry fees throughout the 2014 NFL season and experienced an overall median net loss of \$30.7. We identified heavily involved sub-groups of players based on number of contests entered, total entry fees, and net loss. These top 1% groups were less likely to restrict themselves to NFL games, exhibited greater time involvement, but also won a greater percentage of the contests they entered than typical players.	with DFS and we must understand this involvement and assure the safety of these players. To accomplish this objective, future research needs to replicate these findings using other cohorts of DFS players, extend these findings by examining cohort behaviour across seasons, and implement additional measures and statistical analyses to examine different features of the DFS player pool. Research needs to identify sub-populations that might be at greater or lesser risk for developing problems related to their DFS participation.
Rockloff et al., 2019  Australia  Quality rating: High	Test the potential relationship between use of simulated mobile gambling products and real-money gambling.	Mixed methods, survey and RCT.  EGM gamblers, N=736 for the survey, of which N=556 participated in the RCT with a medium-term F/U.  Mobile EGM games.	Participants completed a survey base on their current and retrospective use of simulated and real-money gambling products. By invitation a sample volunteered to participate in the trial. Half (48.2%) were randomly assigned to play a simulated game for at least 5 min each week. Simulated gambling sessions were recorded for both Lucky Lolly Slots and any other gambling apps played by the participants.	People who had played gambling-themed EGM apps at some point in their lifetime had a higher frequency of play on real-money EGMs and were more likely to admit to current gambling problems. People who played a simulated EGM app prior to age 13 nominated an earlier age at which they “gambled the most” in adolescence. In the 24 weeks trial, people’s app play in 1 week reliably predicted increases in real money gambling the following week. We found no evidence that people who were trying to reduce their expenditure were contrarily influenced to gamble less as a result of their app play, with their app-sessions similarly being related to increases in expenditure.	Gamblers who play simulated games are likely to be influenced to gamble more on real-money forms of gambling as a result of their use. There are concerns about the widespread availability and popularity of such gambling-themed simulators amongst children and adolescents.
Russel et al., 2019  Australia	Examine the profile of in-play bettors who engage in betting on micro events or 'micro-betting'.	Survey.  Sports bettors,  N=1813.	Participants completed an online survey assessing behavioural and psychological	More highly engaged bettors, including those with gambling problems, are more likely to bet on micro events, and place more of their bets on micro events. Of those who bet on micro events, 78% met	Micro event betting appears to appeal almost exclusively to bettors with gambling problems, so a ban would represent a highly targeted intervention to reduce gambling-related harm.

Author, year, location	Study aims	Research design, sample, emerging tech focus	Methods	Main findings	Conclusions
Quality rating: Low		Micro-betting online.	characteristics and betting behaviour.	criteria for problem gambling and only 5% non-problem gambling (vs. 29% and 28% respectively for non-micro event bettors). Placing a higher proportion of bets on micro events was also related to problem gambling. Micro event bettors were likely to: be younger, well-educated and single; engaged in a wider variety of gambling activities; and to have high trait impulsivity.	
Wardle et al., 2019 UK Quality rating: Low	Exploration of the extent to which skin gambling is associated with more traditional forms of gambling, and its variation across sociodemographic/economic characteristics.	Secondary data analysis.  Youth ages 11-16 years,  N=2,881.  Skin gambling.	Secondary data obtained from the 2017 Youth Gambling Survey. Relevant questions included usage of own money for a large range of gambling activities, how often they had spent their own money in the past year, and GP severity.	Betting on skins and other forms of gambling increased with age and concordance of skin gambling/betting was greatest for those who also gambled online. At-risk and problem gambling rates were significantly higher among those who had both bet with skins and engaged in other forms of gambling activity in the past month than those who had gambled on other activities alone. Rates of at-risk and problem gambling were highest among gamblers who also engaged in skin gambling/betting	Among children, whilst gambling and gaming behaviours do cluster, and do so more for some groups than others, there is also a sizeable majority of children who engage in neither activity or who do one but not the other. Some evidence exists also of co-occurring practices among children, especially those conducted through the same medium, where there is a high level of concordance between skin gambling/betting and online gambling.
Zendle et al., 2018 USA Quality rating: Low	Examine of loot box spending and PG severity in an international sample.	Survey.  Gamers ages 18 or older, N=7,422. USA (n=3290), UK (n=572), and Canada (n=525).  Loot boxes.	Participants completed an online survey assessing PG severity, gambling behaviour and engagement, and expenditure on loot boxes.	We found evidence for a link between the amount that gamers spent on loot boxes and the severity of their problem gambling. This link was stronger than a link between problem gambling and buying other in-game items with real-world money, suggesting that the gambling-like features of loot boxes are specifically responsible for the observed relationship between problem gambling and spending on loot boxes	It is unclear whether buying loot boxes acts as a gateway to problem gambling, or whether spending large amounts of money on loot boxes appeals more to problem gamblers. However, in either case these results suggest that there may be good reason to regulate loot boxes in games.
Zendle et al., 2019 USA	Measure problem gambling and loot box spending in a sample of gamers from the USA and remove previous research limitations (self-	Survey.  Gamers aged 18 or older,  N=1,172.	Participants completed an online survey assessing PG severity and spending habits in games.	Evidence for a link between the amount that gamers spent on loot boxes and the severity of their problem gambling was found. Previous research strongly suggested both the size and the direction of link between loot box use and problem	Either loot boxes act as a gateway to problem gambling, or individuals with gambling problems are drawn to spend more on loot boxes. In either case, we believe that these results suggest there is good reason to regulate loot boxes.

Author, year, location	Study aims	Research design, sample, emerging tech focus	Methods	Main findings	Conclusions
Quality rating: Low	selected sample and awareness of aims).	Loot boxes.		gambling. This paper provides further support for this link.	
Zendle et al., 2019  UK  Quality rating: Low	Investigation of the size and importance of links between loot box spending and PG in adolescents.	Survey.  Older adolescent gamers aged 16-18 years,  N=1,155.  Loot boxes.	Participants completed an online survey, recruited via posts on Reddit. The survey assessed loot box spending and PG.	Evidence for a link between loot box spending and PG in adolescents was found. The link was of moderate to large magnitude. It was stronger than relationships previously observed in adults. Qualitative analysis of text data showed that gamers bought loot boxes for a variety of reasons. Several of these reasons were similar to common reasons for engaging in gambling.	Loot boxes either cause problem gambling among older adolescents, allow game companies to profit from adolescents with gambling problems for massive monetary rewards, or both of the above. Possible strategies for regulation and restriction are given.
Zendle et al., 2020  UK  Quality rating: Low	Determine what proportion of top-grossing video games contained loot boxes and how many of those games were available to children.	Survey.  Top-grossing games on Google Play store (N=100), AppleApp store (N=100) and Steam (N=50).	The prevalence of loot boxes was measured for each platform, split by age rating	A total of 58.0% of the top games on the Google Play store contained loot boxes, 59.0% of the top iPhone games contained loot boxes and 36.0% of the top games on the Steam store contained loot boxes; 93.1% of the Android games that featured loot boxes and 94.9% of the iPhone games that featured loot boxes were deemed suitable for children aged 12+. Only 38.8% of desktop games that featured loot boxes were available to children aged 12+	Loot boxes appear to be prevalent in video games that are deemed suitable for children, especially on mobile platforms.
Zendle et al., 2020  UK  Quality rating: Low	Examine of loot box features and a possible differential impact on harm.	Survey.  Gamers,  N=1200.  Loot boxes.	Participants were surveyed assessing loot box expenditure for each of seven key variations, such as opportunities for cashing out, allowing gamers to pay to win, and PG.	Being able to cash out, showing near-misses, and letting players use in-game currency to buy loot boxes may weakly strengthen the relationship between loot box spending and problem gambling.	Regardless of the presence or absence of specific features of loot boxes, if they are being sold to players for real-world money, then their purchase is linked to problem gambling.

Appendix 11. Prevalence of gambling and levels of risk in Australia and Internationally

First author, year, location	Study aims	Research design and FU, Target group & sample size	Gambling participation rate	Rate of gambling problems	Main findings
Andrie et al., 2019  Multi-country survey	Determine distribution of rates of PG in adolescents across seven European countries	A cross-sectional school-based study was conducted in Germany, Greece, Iceland, The Netherlands, Poland, Romania and Spain.  N=13,284	Past year gambling across all countries was 12.5% Greece 29.7 Spain 7.4 Romania 25.4 Poland 16.0 Germany 12.5 The Netherlands 12.6 Iceland 11.9	At risk or PG combined overall rate was 3.6%. Greece 5.0% Spain 1.3% Romania 8.8% Poland 3.4% Germany 2.2% The Netherlands 3.0% Iceland 2.1%	Higher proportion of adolescents was either at risk or had a gambling problem among males, in the older age group, when the parental educational level was lower/middle, and in the absence of siblings. Being at risk or having a gambling problem was associated with lower age at first use of the internet, lower school grades, using the internet 6–7 days per week, and problematic internet use.
Banks et al., 2019  UK	Review of studies reporting on the prevalence of GD among prisoners across international jurisdictions.	Systematic review.  Studies on prevalence of GD among prisoner populations, N=12 studies with N=3892 participants.	NA	Prevalence estimates of problem or pathological gambling in male prisoners ranged from 10.4% to 73% and in female prisoners from 5.9% to 45%.	This systematic review has identified high rates of problem and pathological among inmates in Australia, Canada, New Zealand, the United Kingdom and the United States. Addressing gambling disorder among prisoners and, in turn, reducing gambling-related offending necessitates the development of appropriate interventions at each stage of the criminal justice system.
Browne et al., 2019  Australia  Grey Literature	Measure prevalence of participation and PG in adults aged 18+ living in New South Wales.	Random digit dialling was used to provide a sample representative of the population.  N=10,012	Past year gambling was 53.0%  Lotteries: 37.0% EGM: 16.0% Racing: 13.0% Casino 5.0% Sports: 9.0%  Online: 19.2%	Low risk 6.6% Moderate risk 2.8% PG 1.0%	Just over half of NSW adults surveyed had participated in at least one gambling activity in the last 12 months. This represents a significant decrease since 2011, when approximately 65% of respondents reported participating in at least one form of gambling in the last 12 months. Men were more likely to have participated in at least one gambling activity than females. Younger gamblers are more likely to engage in most forms of gambling, including EGMs, sports betting, casino table games and various forms of internet gambling. Older gamblers are more likely to buy lottery tickets. Based on self-reported gambling spend, PGs account for 36.7% of gambling expenditure, with low and moderate-risk gamblers accounting for a further 19.5% and 14.5% respectively, or 70.7% in total.
Choliz et al., 2019  Spain	Determine the risk of online gambling and prevalence of gambling and gambling disorder	Stratified random sampling based on a national census  General population  N=6816	Past year gambling was 69.5%  Lotteries: 72.6% Wagering: 3.4% Sports betting: 20.3% Online betting: 7.9% Casino: 5.3% EGM: 8.9%	Low risk NR Moderate risk NR Rate of PG 0.72	Women had a significantly lower prevalence of PG than did men in all age groups young people and young adults were more likely to be involved in online gambling. The prevalence of PG in gamblers who had gambled online was 7.26%, whereas in those who had not it was 0.69%. Online gamblers did so 10 times more frequently than gamblers who had not gambled online.
Cowlishaw et al., 2020  Australia	Examine gambling problems among firefighters in Australia.	Survey of all firefighters in a South Australian Fire service, N=1061	NR	Any risk 12.3% At risk 10.0% (1-4 PGSI) PG 2.3% (>5 on PGSI)	Gambling problems across a spectrum of severity may be significant yet hidden issues among emergency service workers, and thus require increased recognition and responses at the organisational level.

First author, year, location	Study aims	Research design and FU, Target group & sample size	Gambling participation rate	Rate of gambling problems	Main findings
Cox et al., 2020  The Netherlands	Examine speculative trading behaviour and its relationship with gambling problems.	Two different representative panels of Dutch investors  N=619	Past year gambling was 10.7%	Low risk 38.6% Moderate risk 3.6% PG 4.4%	Investors with symptoms of compulsive gambling problems tend to follow a more active and speculative trading style, indicated by a higher frequency of stock trading, day-trading and investing in derivatives and leveraged products.
Economou et al., 2019  Greece	Estimate 1-year prevalence of PG in the general population in Greece during economic recession.	Representative telephone survey with stratified sampling plus a patron survey.  N=5804	Past year gambling was 41%.	Low risk 7.4% Moderate risk 5.5% PG 2.4%	Male gender, minority status, living with family of origin, low educational level and low to zero income were found to constitute the risk factors of the disorder. Having started gambling during the recession increased the odds of PG however, this finding was gender specific (males).
Gallaway et al., 2019  USA	Prevalence of PG and its association with demographics and behavioural characteristics in a US military cohort.	Annual cohort CATI study of military in Ohio  N=1553	Past year gambling was 50%.	Low risk NR Moderate risk NR PG 7.7% (lifetime)	Military members reported frequent gambling at nearly twice the US prevalence. PG was correlated with depression, alcohol use and legal problems. Routine screening for PG may be needed for military populations.
Gambling Commission, 2018  UK  Grey Literature	Explore gambling behaviours and attitudes in 11-16-year old people in UK	Representative survey of 11-16 years old students in England and Wales with an additional sample from Scotland. Surveys completed in class time.  N=2865	Past year gambling was 39.0%  Lotteries: 10.0% VLT: 17.0% Online: 5.0% Private betting 16%	Low/Moderate risk 2.2% PG 1.7%	Patterns of young people's gambling is similar to previous years. Much of the gambling activity among this age group takes place in locations that do not require a gambling premises licence (for example, playing on fruit machines in pubs or private bets at school or at home). Underage gambling activity is less prevalent at licensed premises such as betting shops, bingo halls and casinos. Gambling in the past week continues to be twice as prevalent among boys (18%) as among girls (9%). Among those who had gambled in the past week, the average spend on gambling activities was £16 from an average disposable income of £28 (money given to them as pocket money or money earned in the past week).
Grant et al., 2019  USA	Examine the prevalence of PG and associated mental and physical health correlated including alcohol and substance use in a Midwestern university sample.	Cross sectional representative health and addictive behaviours survey of a large Midwestern university.  N=3421	NR	Low and moderate risk combined 8.4% PG 0.4%	University students with maladaptive gambling had significantly higher rates of multiple types of substance use, both licit and illicit. Maladaptive gambling was significantly associated with elevated use of nicotine, cocaine, alcohol, amphetamine, heroin, prescription painkiller, and sedative medication.
Latvala et al., 2019  Finland	The relationship between gambling, at-risk and PG and grade point average among Finnish people aged 18–29 years	A nationwide cross-sectional random sample  N=676	Past year gambling was NR  Lotteries: 97.0% Wagering: 5.3%	At risk and PG combined into a single category of 24.5%	Poorer school achievement is associated with frequent gambling, a large number of game types played and online gambling and game type preferences. Those with lower GPA played fast and low-paced daily lottery games and used online casinos significantly more. For

First author, year, location	Study aims	Research design and FU, Target group & sample size	Gambling participation rate	Rate of gambling problems	Main findings
			Online: 37.7% Casino: 22.2% EGM: 65.2%		women with a low GPA online gambling and playing slot machines were more common.
Lelonek-Kuleta et al., 2020 Poland	Estimate participation and problems associated with e-gambling in Poland	A nationwide representative random sample selected on the basis of Personal Identification Number.  N=2000	Online past year gambling was 4.10%  Offline past year gambling was 37.1%	At risk and PG combined into a single category of 26.8% (of those engaged in e-gambling not population)	Men, younger people, and people who earn less are more often involved in e-gambling. The most popular e-gambling games were lotteries and sports betting.
Nowak, 2018 USA	Synthesise the prevalence rates of pathological and PG rates among college students.	Meta-analysis.  N=6 studies, N=2,130 college athletes.	NA	Prevalence of PG was 8.97% and probable pathological was 6.46%.	Suggested athletes had somewhat higher rates of disordered gambling than their general college student counterparts.
Palmer du Preez et al., 2019 New Zealand Grey Literature	Gender analyses of the New Zealand National Gambling Study.	A nationally representative cohort study of adults aged 18+ years using face-to-face computer-assisted personal interviews (CAPI)  N=6,251	Past year gambling was 80%  Lotteries: 46.76% EGM: 13.71% Racing: 11.69% Casino 9.44% Sports: 15.63%	Low risk 4.9% Moderate risk 1.7% PG 0.64%	20.4% of women and 20.0% of men reported that they did not engage in any gambling activities over the past year. Women were more likely than men to gamble on New Zealand raffles/lotteries (49.9% vs. 43.4%), Instant Kiwi/other scratch tickets (36.3% vs. 28.0%), text games/competitions (3.2% vs. 2.1%), and Housie/bingo (2.2% vs. 0.09%). Males had higher rates of problems compared with females.
Paterson et al., 2019 Australia Grey Literature	Monitor the social and economic impacts of gambling in the Australian Capital Territory.	Representative random digit dial survey of adults 18 years and older.  N=10,000	Past year gambling was 60.0%  Lotteries: 43.8% EGM: 20.0% Racing: 19.7% Casino 5.8% Sports: 9.7%	Low risk 7.0% Moderate risk 2.5% PG 0.8%	60% of the ACT population gambled in the past 12 months). This results in a substantial level of harm: 14% of ACT residents. Men (particularly those under 45 years old), are disproportionately engaged in gambling activity and experience harms at significantly greater rates than women. Males are classified as at-risk or PGs at twice the rate of females and classified as PG's at three times the rate. 79% of people who bet on sports and special events had gambled online in the past 12 months, followed by 50% of those who bet on horse and greyhound racing, and 30% of lottery gamblers. The largest portion of online gambling in is the lottery, with 13.3% of the adult population participating online. One in five people use EGMs, and nearly one-third of these people are at-risk or PGs.
Richard et al., 2019 USA	Identify differences in the severity of PG between sexual minority and heterosexual student athletes.	A large nationally representative sample of college student-athletes drawn from a self-reported survey.	Past year gambling NR  Casino: 14.3% Racing: 4.8% Sports: 15.8% Internet casino: 4.1%	At risk and PG combined into a single category of 4.5%	Gay and bisexual men had disordered gambling scores three and a half times higher than heterosexual men. Gay/lesbian and bisexual women reported disordered gambling scores two and a half times higher than heterosexual women when adjusting for race/ethnicity and years in college.

First author, year, location	Study aims	Research design and FU, Target group & sample size	Gambling participation rate	Rate of gambling problems	Main findings
		N=19,299	Lottery: 35.8% EGM: 9.9%		
Rockloff, 2020  Australia  Grey Literature	Determine participation and prevalence of PG and gambling harm in Victoria.	Population-representative survey using Random digit dialling.  N=10,638	Past year gambling was 69.0%  Lotteries: 44.4% EGM: 14.1% Racing: 19.8% Casino 6.1% Sports: 5.8	Low risk 6.7% Moderate risk 2.4% PG 0.7%	Gambling participation was highest for persons aged 65-74 (78%) and lowest for persons 18-24 (52.4%). Gambling participation increases with income, where 57.3% of people earning \$1-20,799 per year gambled in the prior 12 months, compared to 78.9% of persons earning more than \$156,000. Aboriginal and Torres Strait Islander peoples have higher rates of PG (2.9%) than other Victorians. 19.2% of all adults have placed bets online within the prior 12 months. There has been a dramatic growth in online race and sports betting. An estimated 34.7% of gamblers who took part in horse, harness or greyhound race betting had placed bets online. A large majority (78.1%) of all people who had bet on various sports, such as AFL, Cricket or Soccer, had placed bet(s) online within the prior 12 months.
Terzic-Supic et al., 2019  Serbia	Examine the association of PG and socio-demographic and lifestyle characteristics	Secondary analysis of the National Survey on Lifestyles in Serbia: Substance Abuse and Gambling.  N=5,385	Ever gambling was 60.0%  Lotteries: 91% EGM: 9.1% Casino: 6.2% Sports: 28.7% Online: 1.2%	Low/Moderate risk 3.1% PG 0.5%	Low/moderate gambling was associated with having poor self-perceived financial status, number of drinking days per year, using any illicit drugs in the last 30 days, playing sports betting, slot machines, and online betting. PG was associated with having poor self-perceived financial status, having moderate or high risk for psychological distress, playing sports betting, casino games and slot machines.
Van der Maas et al., 2018  Canada	PG and gambling-related behaviours among older adults.	Representative random residential household telephone survey of adults aged 55 and over: general population and an oversample of regular gamblers.  N=2,187	Past year gambling was 69.7%  Lotteries: 56.5% EGM: 22.5% Racing: 3.6% Casino 2.9% Sports: 2.1% Online: 0.5%	No risk/Low risk: 98.1% Moderate/severe PG 1.8%	Prevalence of PG and past-year gambling participation among older adults was lower than the general adult population. More men regularly participated in lotteries and draws while more women participated regularly in other forms of gambling.
Wildman et al., 2019  Isle of Man  Grey Literature	Examine gambling behaviour in the Isle of Man population.	Representative gambling survey based on 2016 census data.  N=2,303	Past year gambling was 75.9%  Lotteries: 56.9% EGM: 6.9% Racing: 7.47% Casino 3.4% Sports: 1.3% Online: 18.5%	Low risk 7.0% Moderate risk 1.5% PG 0.7%	Gamblers are more likely to have poor general health, be overweight/obese, have poor mental wellbeing, poor diet, be smokers, and have high risk for drinking and binge drink. Men, young people, people on low income/lower socio-economic status and gambling venue employees are at increased risk of gambling. Greater accessibility to gambling outlets and socio-economic disadvantage are associated with increased risk of gambling.

First author, year, location	Study aims	Research design and FU, Target group & sample size	Gambling participation rate	Rate of gambling problems	Main findings
Woods et al., 2018  Grey Literature	Estimate PG participation and prevalence in South Australia,	Representative State-wide CATI survey  N=20,017	Past year gambling was 65.0%  Lotteries: 48% EGM: 19% Racing: 12% Casino 6% Sports: 7%	Low risk 4.6% Moderate risk 2.2% PG 0.7%	A significant decrease in gambling participation from the equivalent 2012 result of 69%. PG and MR stayed the same but there was a 2.5% reduction in low-risk gamblers. Those who gambled on the internet during the past 12 months were classified as at-risk gamblers (9.6%) more than non-internet gamblers (3.2%). The most frequent online activities were fantasy sports (76% of players had bet online), sporting events (75% had bet online) and novelty events (61% had bet online). Gamblers who would bet on an activity online typically bet more frequently than those who did not bet online.

Note: Quality ratings were not included because all population samples are representative.

## Appendix 12. Understanding the measurement of harm

First author, year, location	Study aims and methods	Key Findings	Recommendations for future research
Abbott et al., 2018  Canada  International expert opinion  Quality rating: Low  Grey Literature	Develop a conceptual framework to address a broad set of factors related to the risks and effects of harmful gambling at the individual, family, and community levels.	A comprehensive, internationally relevant conceptual framework of “harmful gambling” that moves beyond a symptoms-based view of harm and addresses a broad set of factors related to population risk, community, and societal effects. Factors included in the framework represent major topics relating to gambling that range from specific (gambling environment, exposure, types, and resources) to general (cultural, social, psychological, and biological). Topics specifically related to harm include RG and the Reno model, social and economic impacts, low-risk limits.	Gambling environment: Evidence-based policy making, addressing new forms of gambling, impact on indigenous people and grassroots advocacy. Gambling exposure: normalisation, venue location and design, expansion through technology, incentives. Gambling types: participation rates in low and high harm products, gambling and gaming, youth. Gambling resources: treatment availability and hours, integrative and innovative resources, youth education and prevention. General topics: Culture, older people, financial instability, prison populations, gambling in mental health populations, physical health, recreational gambling. Research design: longitudinal research, interdisciplinary, separation of results by gender.
Angus et al., 2019  Australia  Cross-sectional survey  Quality rating: Moderate	Explore and contrast harms in treatment seeking and community samples  N=480	Gamblers in a community reported lower overall levels of harm across seven domains including psychological distress compared to a clinical sample. Similar patterns were observed when examining participants meeting PGSI criteria for PG, and for those PGs experiencing any level of harm.	High levels of psychological and financial harm are a robust characteristic of individuals in treatment. Although overall rates of harm attributed to gambling were lower in the community, approximately a fifth of the sample failed to meet the PG cut-off scores reported harms. Exclusively using the PGSI may result in incorrect estimates of the number of gamblers experiencing harm.
Baxter et al., 2019	Apply the Conceptual Framework of Harmful	A greater percentage of Australia and NZ publications address the gambling environment and exposure to	Psychological and biological factors dominate gambling research in Canada whereas resources and treatment have received more



First author, year, location	Study aims and methods	Key Findings	Recommendations for future research
Scoping review of research from Canada, Australia and New Zealand  Quality rating: Moderate	Gambling (CFHG), to Canada, Aust. and NZ to examine the research outputs and alignment with the framework.	gambling than in Canada. The subset of articles focused on harm showed a stronger focus on harms among NZ and Australian researchers compared to Canadian-authored publications. In Australia most of the harm-focused publications were ascribed to gambling exposure (33.0%), followed by an almost equal percentage of gambling environment (25.0%) and cultural factors (24.5%) publications. Gambling types also had higher than average numbers of harm publications (22.4%), as did gambling resources (18.8%), psychological (10.3%), and biological factors (11.4%). Social factors (11.9%) were very close to the overall average.	attention in NZ. Gambling research foci may be shaped by jurisdictional regulation of gambling. Australia with privately operated gambling focused on harm factors that are the operators' responsibility, whereas jurisdictions such as NZ with a public health model focused on treatment and harm reduction resources. In the absence of a legislated requirement for public health or harm minimisation focus, researchers in jurisdictions with government-operated gambling tend to focus research on factors that are the individual's responsibility and less on the harms they experience. Given increased international attention to gambling-related harm, regulatory and research environments could promote and support more diverse research in this area.
Browne et al., 2019  Australia  Cross-sectional survey  Quality rating: Moderate	Determine whether dependence and harm are measurably distinct constructs Determine whether harm mediates the relationship between dependence and wellbeing Determine whether separate measures are more effective than a unidimensional problems measure in predicting wellbeing	Development of an 8-item measure of behavioural dependence (BD) which appears distinct from harm. Items in the BD measure are focused on mood, tolerance, chasing, lying, escape and difficulty stopping (typical DSM dependence criteria). BD was shown to be highly reliable and unidimensional, and measurably distinct from gambling harms. Harm mediated the negative relationship between BD and wellbeing. The harm + BD model yielded better predictions of personal wellbeing than a unidimensional, continuous problems measure—and explained about twice the variance of a simple contrast between problem and non-PGs.	This study has not attempted to determine a threshold for the BD scale such that a classification of dependence/disorder might be made. Partly, this reflects the view that behavioural dependence, like harm, exists on a continuum between very mild to severe. It also reflects our uncertainty as to what the criterion for setting the threshold should be. The results reported are derived from a single sample. Further employment of the BD scale in different populations is required to confirm these results.
Delfabbro et al., 2019  Australia  Non-systematic review  Quality rating: Low	Summarise the findings from recent harm research, the methodologies used and their conceptual implications.	Previous research has failed to capture gambling-harm in a way that is useful to inform public policy and regulation. Most standardised psychometric measures and the DSM classifications have conflated gambling behaviour and harm and mostly focused on serious harms. Little has generally been known about the prevalence of harm in lower risk gambling groups. Strong progress has been made in the categorization and measurement of gambling harm. It is also now possible to gain insights into the types of harms likely to characterise different levels of gambling risk.	Caution must be applied when applying these measures to estimate the 'burden of disease' associated with gambling in the community. Determine the differentiation of opportunity cost and harm. That is, where does one draw a line between what one might consider harm as opposed to a relative cost associated with the choice? Examine the validity of additive methods involving different severities of measured harm. Caution should be applied when asking people to rate the burden of harm against unfamiliar disorders Examine the validity of prevention paradox arguments in this area of research. This refers to the situation where the largest proportion of disease cases often emerge from low risk populations and that a greater burden of harm can be observed in low risk populations Develop psychometric measures that can be used in prevalence research to capture gambling-related harm and shift research beyond a sole focus on single prevalence figures.

First author, year, location	Study aims and methods	Key Findings	Recommendations for future research
			The above issues should be taken into account when developing such a tool.
Moayeri, 2019 Australia Cross-sectional Quality rating: Low	Investigate the impact of gambling habits on Health State Utility Values (HSUVs) and health related quality of life (HRQoL) using SF-36 measure.  General population sample,  N=17,606	Data from 2015 wave of the Household Income and Labour Dynamics in Australia survey was used. The predicted HSUVs on Australian weights for low- and moderate-risk and problem gamblers were -0.030, -0.057 and -0.181 less than non-gamblers &/or non-problem gamblers. Low HSUVs related to gambling behaviour were predicted by age, gender, education, and employment. Gambling was responsible for 443.44 QALY losses in 2015 in the Australian general population.	Gambling is significantly and negatively associated with HRQoL and HSUVs and the magnitude of this association is determined by the severity of the gambling problem
Rockloff et al., 2019 Australia Secondary analysis of prevalence survey  Quality rating: Moderate	Determine whether participation in gambling provide a net benefit to the involved population; inclusive of gamblers and affected others?	A weighted average of all the positive and negative influences on quality of life, inclusive of gamblers and affected others, revealed that the quality of life change from gambling is either a very modest + 0.05% or a more concerning - 1.9% per capita. Gambling generates only small or negative net consumer surpluses for Tasmanians.	Explore the net benefits that people experience from use of particular products, such as EGMs and lottery products, which are likely to have different mixes of benefits and harms to gamblers and affected others. Different product mixes in any one jurisdiction could radically alter the net benefit calculation, and therefore the outcomes calculated in Tasmania may not translate to other locations. Explore whether the characteristics of gamblers and affected others, such as their demographic backgrounds or psychological vulnerabilities, could influence the net benefits or harms that they experience.

### Appendix 13. Policy and regulation of gambling in Australia

First author, year, location	Study aims	Research design, target group & sample size	Methods	Main findings	Conclusions
Bouguettaya et al., 2020 Australia Quality rating: High	Examine the relationship between gambling advertising and gambling related attitudes, intentions and behaviours.	Systematic review.  N=27 studies, N=32,181 participants.	Studies were included if they were published after 1999 and fit a combination of advertising keywords.  Studies were excluded if they were reviews, commentary, or content analysis.	A positive association between exposure to gambling advertising and gambling-related attitudes, intentions and behaviour was found. The association is greatest for gambling behaviour. There is some evidence for a dose-response relationship. The quality and breadth of research on gambling advertising are weaker than those in comparable areas (e.g., alcohol,	The breadth and quality of research in this area needs to be improved. Governments and non-gambling funded bodies need to invest in quality research on the effect of gambling advertising. In the absence of government funding for research in this area, it is possible that the gambling industry funded research, as found with the tobacco and alcohol

First author, year, location	Study aims	Research design, target group & sample size	Methods	Main findings	Conclusions
				tobacco), with an absence of longitudinal and experimental studies.	industry, could result in a biased and/ or unreliable evidence base.
Browne et al., 2019 Australia Quality rating: Moderate	Determine whether exposure to wagering advertisements and inducements influences betting behaviour.	Online survey and Ecological Momentary Assessment (EMA).  Race bettors (n=402), and sports bettors (n=320), n=722 initial survey.  N=597 F/U EMA	Measured regular exposures to 20 different forms of marketing, as well as wagering spend. Up to 15 assessments per participant were conducted over 3 weeks, yielding 6,843 observations for analysis.	Exposure to advertising and inducements was reliably linked to a greater likelihood of betting, higher intended and actual betting expenditure, and spending more than intended. “Push” messaging and inducements that convey the impression of reduced risk were particularly influential, as well as brands promoted during events and advertisements on betting websites/apps.	Restrictions on these forms of marketing are advisable. This is particularly important for marketing that is “pushed” to gamblers or that suggests reduced risk.
David et al., 2019 Australia Quality rating: Low	Develop a framework to guide the application of public health advocacy strategies aimed at preventing and reducing gambling-related harm.	Conceptual.	A narrative review of theories of change and public health advocacy literature.	An eight-step public health advocacy framework was created, which outlines the critical steps and considerations when developing and implementing successful change efforts. These include, establish a sense of urgency, form a powerful guiding coalition, create a vision, communicate the vision, empower others to act on the vision, plan for an create short-term wins, consolidate improvements and produce more change, and institutionalise new approaches.	To date, a clear public health advocacy approach to gambling harm prevention and reduction has not been well established. A gambling specific framework to guide future public health advocacy efforts to prevent and reduce gambling harm is proposed.
Gainsbury, et al. 2018 Australia Quality rating: Moderate	Examine how consumers select Internet gambling sites, and the characteristics of those who use offshore as opposed to domestic sites	Online survey  Past-month Australian Internet-gamblers completed an online survey  N=1,001	Participants responded to questions about their online gambling, including use of offshore sites, reasons for site selection, awareness of regulations, preferences for regulated sites, and gambling-related problems.	Offshore gamblers (52.7 percent) were a distinct demographic cohort, and were more highly involved in online gambling. Lack of awareness of gambling regulation did not sufficiently explain use of offshore gambling sites; both groups had a relatively low concern for where a site was regulated, choosing sites instead based on ease of use, and cues that they were designed for gamblers in the advertised jurisdiction.	Use of offshore gambling sites may be discouraged by focusing on the benefits of domestic sites and ensuring that these can provide a good consumer experience.
Hing et al., 2019 Australia	Examined exposure to wagering advertisements	Ecological Momentary Assessment.	After completion of baseline survey bettors completed up to 15 surveys administered on 5	Regular bettors have almost daily exposure to wagering advertising, including for inducements. The most frequently seen and influential advertisement types were direct	Results did not vary by gambler risk group. Understanding which types of wagering advertising are associated with most gambling-related harm can inform

First author, year, location	Study aims	Research design, target group & sample size	Methods	Main findings	Conclusions
Quality rating: Moderate	and inducements and their influence on betting behaviour.	Regular bettors, N=722.	days per week over three non-consecutive weeks.	messages and advertisements on betting websites or apps. The findings indicate that wagering advertisements, including for inducements, are likely to be having powerful effects on regular bettors. On each day that respondents saw these advertisements (most days for most advertisement types), substantial minorities reported increased size and frequency of betting.	advertising regulations, targeted public health interventions, and future research.
Jenkinson et al., 2019 Australia Quality rating: Low Grey Literature	Develop a national consumer protection framework for wagering.	Survey and interviews  Self-selected adult Australians who had gambled in preceding 12 months,  N=5076	Survey and semi-structured interviews with wagering service providers and regulators and a survey of Australian people who wager online.	Regulators were very supportive of the Framework, describing it as a positive development in encouraging stronger consumer protection measures and promoting the regulation of online wagering in Australia. While available consumer protection measures were generally perceived as being useful open text responses revealed that many participants did not view themselves as experiencing gambling-related harm and felt that some of the features applied more to people 'at risk' or already experiencing gambling problems.	Reduce the harm of online wagering to consumers by bringing Australian consumer protection measures for online wagering up to date, ensuring they reflect best practice nationally, and addressing the current regulatory fragmentation across jurisdictions.
Livingstone, 2019 Australia Quality rating: Very Low Grey Literature	To identify the gaps in the evidence, strategies, policies and interventions to prevent or minimise gambling related harm.	Expert opinion	Literature review and policy, interventions, issues and opportunities from four other fields of public health, relevant to the prevention and reduction of harm derived from gambling.	Multiple topics for consideration in the advancement of gambling harm prevention and minimisation policy and interventions were identified. Electronic gambling machine (EGM) and online/mobile wagering sectors constituted the most significant areas of concern around gambling harm, based on available data around rates of harm and population prevalence of use.	Each of these areas produced a range of likely areas for development of action in the prevention and minimisation of harm from Gambling.
Livingstone, 2018 Australia Quality rating: Low	To discuss and develop policy solutions for preventing and minimising harm from EGMs.	Narrative review	NR	Social harm cost estimates of \$214.2 million p.a. EGM accessibility in the ACT is high. EGMs are available throughout the Territory, and EGM venues are often large and centrally located. They may operate until 4:00 am and provide EGMs set at high parameter values, increasing the intensity of gambling.	A number of policy related solutions were identified. Including, restriction of EGM business operation (number of outlets, machines, hours of operation and machine mechanics), and inclusion of honest, effective, and appropriate warning messages..

First author, year, location	Study aims	Research design, target group & sample size	Methods	Main findings	Conclusions
Grey Literature					
Lole et al., 2020  Australia  Quality rating: Low	Use eye-tracking technology to examine the impact of the most commonly occurring inducements that offer financial incentives to gamble.	Regular sports bettors (n=49) and non-gamblers (n=10),  N=59.	Participants viewed a series of sports betting advertisements, then each participant was asked to rate how likely they would be to take up the offer presented. Both eye gaze and electrodermal activity was recorded.	The number of fixations placed on each offer differed according to the type of inducement shown, with reduced risk and cash back inducements being looked at more often than better odds and bonus bet inducements. Increased electrodermal activity while viewing the advertisements was associated with greater severity of gambling-related harm, as well as greater ratings of desire for most advertisements. Rating of desire was, likewise, positively associated with gambling-related harm.	For individuals already at risk of gambling problems, exposure to these advertisements, especially those offering what is perceived to be safer betting options that minimise financial losses, may exacerbate existing harms.
Nyemcsok et al., 2018  Australia  Quality rating: Low	Explore young people's awareness and recall of sports betting brands, their perceptions of influence and ability to engage critically with the information.	Young people aged 11-16 years,  N=111	Participants completed interviewer-assisted surveys investigating recall and awareness of sports betting brands, perceptions of promotional strategies, intention to gamble, and reasons for betting on particular sports.	Young people had high recall and awareness of advertising. A fifth of young people expressed intentions to gamble at 18 years, with boys significantly more likely than girls to state they would gamble. Young people perceived that advertising strategies associated with inducement promotions would be the most influential in encouraging individuals to gamble. While many young people took promotions at face value, there was evidence that some were able to critically engage with and challenge the messages within marketing.	Current regulatory structures appear to be ineffective in limiting young people's recall and awareness of gambling advertising. Lessons from tobacco control support the application of precautionary approaches as a more effective way to limit young people's development of positive gambling attitudes and behaviours.
Parnell et al., 2019  Australia  Quality rating: Low	Assess the volume and type of unhealthy bus shelter advertisements near schools in Perth and monitor if this varied seasonally.	Content analysis  Bus shelter advertisements,  N=293	An audit of bus shelter advertisements in five local government areas. The type of advertisement was recorded and classified as healthy, moderate or unhealthy. This was conducted in June, September, December 2016 and March 2017.	Of the 293 advertisements recorded over the four audits, 31% featured unhealthy products, 3% moderate, and <1% healthy. Seasonal variation in the volume of unhealthy advertisements was not identified. A total 19 (20.7%) of unhealthy advertising were gambling, which is more than alcohol (11, 12.0%) or non-alcoholic beverages (10, 10.9%), but less than food (52, 56.5%).	Western Australian school students are regularly exposed to unhealthy bus shelter advertisements. Stricter regulation of outdoor advertising is needed to ensure that young people are protected from the influence of unhealthy industries.
Paterson et al., 2019	Review of the Northern Territory (NT) Code of	Exploratory/mixed methods. Online	Venues were approached and requested to send surveys to staff.	The NT Code is one of the more comprehensive of the Australian codes, with several of the measures included in the NT	A significant level of venue noncompliance with the Code was found. There was also considerable variability in the

First author, year, location	Study aims	Research design, target group & sample size	Methods	Main findings	Conclusions
Australia Quality rating: Low Grey Literature	Practice for Responsible Gambling 2016	survey and interviews.  Gambling venue staff, N=66 of whom N=11 completed the interview.	Participating staff who completed the survey were asked to participate in a depth interview.	Code absent from some of the other state and territory codes.	implementation of measures in venues that were compliant. These findings point to a lack of adequate enforcement of the Code, as well as significant issues with training and implementation.
Rawat et al., 2019 Australia Quality rating: Moderate	Examine direct messages received from wagering operators during the week around major Australian sports and racing events.	Ecological momentary assessment.  Sports bettors (n=102), and race bettors (n=110) provided a total of N=931 messages.	Participants completed a baseline survey followed by short daily surveys over a period of 1 week during peak betting periods. Emails and text messages received by wagering operators underwent content analysis.	Messages were saturated with inducements to bet, however no relationships were identified between the content of messages and the gambling risk status or betting frequency of participants. The most common types of incentives offered included bonus bets, rewards points, better odds/winnings, and reduced risk. Frequently promoted inducements included bonus or better winnings, refund/stake back offers, and match your stake/deposit.	Given the influences of inducements on increasing betting expenditure and impulsive betting identified through previous research, taken together with the findings of the current study, direct messages may contribute to experiencing gambling-related harm.
Rehm et al., 2019 Canada Quality rating: High	Examine to what degree the level of use and potency play a role in regulatory policies for alcohol, other psychoactive substances and gambling.	Systematic review.  N=11	Materials relating to the regulatory policies for different substance categories and gambling were included.	Level of use is usually defined around a behavioural pattern of the user, while potency is defined as a property or characteristic of the substance. For all substances examined and gambling, both dimensions were taken into consideration in the formulation of most regulatory policies. However, the associations between both dimensions and regulatory policies were not systematic, and not always based on evidence.	More research is necessary on the differential effects of level of use and potency on health and other harm, but current regulatory policies for substance use and gambling are often not in line with currently available evidence of harm.
Rintoul, A. 2019 Australia Quality rating: Low Grey Literature	Understand measures that had been introduced in other jurisdictions to prevent and reduce gambling-related harm, as well as factors that enabled the introduction of these measures.	Qualitative, semi-structured interviews.  N=34	Researchers visited 11 locations in seven countries and interviewed key informants.	The report suggested registered gambling can assist population level harm prevention measures and regulator monitoring of the gambling industry should be proactively facilitated. Further recommendations include the establishment of a national gambling strategy and national gambling report system and more sophisticated disruption strategies to protect consumers from unlicensed online gambling providers should be deployed;	A summary of key public health lessons that could be considered to improve gambling regulation in Australia has been provided.

First author, year, location	Study aims	Research design, target group & sample size	Methods	Main findings	Conclusions
Rossow, 2019 Norway Quality rating: High	Review of the literature pertaining to validity of the Total Consumption Model (TCM) applied to gambling.	Systematic review. N=12	Empirical studies that examined the total consumption model or provided relevant data. The TCM applied to gambling posits that the higher the consumption of gambling, the higher the proportion of problem gamblers.	All but one of these studies found empirical support for the TCM; that is, a positive association between population gambling mean and prevalence of excessive or problem gambling. Such associations were found both with cross-sectional data and with longitudinal data.	There is a small but fairly consistent literature lending empirical support to the TCM. An important policy implication is that interventions which are successful in reducing overall gambling are likely also to reduce problem gambling incidence.
Shaffer et al., 2019 USA Quality rating: Low	Description of the four principles that characterise a public health perspective focusing on gambling and how this is complemented by the Reno model.	Conceptual.	NA	Both models encompass principles and guidelines that emphasize the shared responsibilities across multiple stakeholders including governments, industry, community welfare, and individuals. The Reno model represents a tactical framework for responsible gambling complementing the broader population public health approach, each model consistent in attempting to prevent the incidence, reduce the prevalence, and minimize gambling disorders and related harms.	When viewing the public health and Reno models as reflecting the common aim of minimizing gambling-related harms, more can be achieved by proponents of both approaches than by criticizing each and working at cross purposes. Both models have significant contributions to make, each in its own but complementary actions.
Stevens, M., et al. 2019 Australia Quality rating: Low	Evaluate two changes in EGM policy on user losses in community venues, and track changes in user losses per adult, EGM gambler, and EGM problem/ moderate risk gambler between 2005 and 2015.	Cross-sectional  The NT Gambling Prevalence and Wellbeing Survey was undertaken in late 2015 and was the follow-up survey to the 2005 NT Gambling Prevalence Survey	Data from the 2005 and 2015 NT gambling surveys are used to determine EGM user losses per adult, per EGM gambler, and per EGM problem and/or moderate risk gambler, with several assumptions applied.	From 2010 (post smoking ban) to 2013, real user losses were stagnant, but from 2013 to 2017, real user losses in community venues increased 19, 9, 8 and 5% per annum, with increases higher in clubs and hotels with the maximum allowable number of EGMs. Over the same period user losses in the two casinos declined by 13%. Between 2005 and 2015, estimated user losses per EGM problem/moderate risk and problem gambler increased by 5 and 34% respectively.	Reductions in how much money gamblers can insert into an EGM (load-up limit), and/or the abolition of note acceptors, and reductions in the number of EGMs in venues is likely to reduce harm from EGM use. Given the demonstrated inability for Australian jurisdictions to identify and implement effective harm prevention and minimisation interventions, a national approach to gambling regulation in Australia may be desirable. Similarly, national co-ordination of research, particularly on EGMs and online betting is required to better understand changes in gambling policy on related harms.
Thomas, S., et al.	Investigate where young people recall having seen	Mixed methods, interviewer assisted surveys.	Young people were recruited at three local community basketball	The majority of young people recalled seeing gambling advertising on television (n=101, 91.0%), with most recalling advertising within	Current regulatory systems for gambling advertising are ineffective, with further restrictions urgently needed across a range of

First author, year, location	Study aims	Research design, target group & sample size	Methods	Main findings	Conclusions
2018 Australia Quality rating: Low	gambling advertising and their perceptions on whether restrictions have gone too far	Young people aged 11–16 years, who were self-reported fans of basketball in Victoria, Australia, N=111.	stadiums. One-on-one interviewer assisted surveys were completed assessing sociodemographic variables, fan engagement, media viewing patterns, recall and awareness of gambling advertising, future gambling consumption intentions, awareness of gambling regulations and suggestions for preventing gambling harm.	sporting matches or games (n=79, 71.2%). Most young people recalled seeing gambling advertising in the early evening before 8:30 pm (n=75, 67.6%). Just over half of young people described seeing gambling advertisements on social media (n=61, 55.0%), and over a third (n=40, 36.0%) recalled gambling advertising on YouTube, predominantly before watching sporting or gaming videos. The majority stated that they continued to watch sport after 8:30 pm (n=93, 83.7%), which is when restrictions on advertising in live sport in Australia end. The majority (n=88, 79.3%) stated that there were too many gambling advertisements in sport. Three quarters believed that sporting codes should do more to prevent young people from being exposed to advertising for gambling in sport (n=84, 75.7%).	media channels to prevent exposure to promotions that may encourage young people's interest and involvement in gambling.





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