Gambling Research Summary 2020-21

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Gambling Research Summary 2020-21

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2. Executive summary

Purpose and focus

This scoping review is the third in a series of reviews of the gambling literature undertaken by the Responsible Gambling Fund (RGF) to inform its research agenda and identify relevant gaps and opportunities. This third review aims to map Australian and international gambling research undertaken since the 2020 Gap Analysis and highlight key gambling studies conducted since then based on their methodological quality, innovativeness and/or applicability to an Australian audience. It maps the research in relation to six research themes that reflect priorities of the RGF's 2021-2024 Research Agenda:

- Gambling prevalence and harm.
- Individual and community level prevention and early intervention.
- Efficacy and effectiveness of treatments.
- Gambling among vulnerable groups.
- Emerging technologies and new trends.
- Gambling industry products, practices, environments and regulation.

Methodology

A scoping review was employed to 'map' the size and scope of the evidence base in relation to the six predetermined themes and their related subthemes. The current scoping review consisted of five stages: (1) development of research themes and subthemes; (2) conduct of systematic search; (3) selection of included studies; (4) data extraction; and (5) data mapping and presentation of the research summary. The systematic search was limited to literature published from January 2020 to 7 September 2021. Given the diversity across the research themes, the electronic database searches were conducted separately in relation to each theme. The agreed approach to presentation of research included a brief mapping of available literature followed by a narrative synthesis of selected highlight studies within each subtheme. Documents were selected for highlight via a 2-part process: (a) the research team presented NSW ORG with recommendations for articles/ reports that could be highlighted within each subtheme based on their methodological quality, innovativeness and/or applicability to an Australian audience, (b) NSW ORG then provided feedback on preferred articles and reports to highlight that were fit for purpose.

Key findings and conclusions

Measuring and understanding gambling prevalence and harm

A total of 74 articles/reports examined this theme, focused on the prevalence of gambling participation, problems, and harm (k[1]=42), longitudinal risk and protective factors and transitions between levels of risk (k=10), and psychometric properties of new and existing instruments for measuring gambling problems and harms (k=30).

[1] k denotes number of articles and/or reports. Some studies relate to multiple subthemes so the sum total of documents across all subthemes may be greater than total number of articles for theme.

Key findings	Gaps and implications
• Most research has focused on identifying prevalence estimates. • Multiple Australian state and territory surveys conducted over the past 15 years reveal consistent estimates of problem and moderate-risk gambling but variable estimates of gambling participation and low-risk gambling. In contrast, two national surveys conducted nearly a decade apart revealed a doubling of problem gambling in the context of declining participation and stable moderate-and low risk gambling. • A range of psychological, social, health, and economic factors predict subsequent problem gambling in longitudinal research. • Few problem gambling measures have been adequately validated for use in population-level screening. • Measures of gambling-related harm display good psychometric properties. • A set of low-risk limits for use in Australia has been identified.	• Further research is required to explore whether methodological differences explain the variations in prevalence estimates, as well as prevalence trends over time. • There is a need for further longer-term research investigating how people move between risk categories over time and the relationship between a range of factors (particularly those that extend beyond individual-level factors) and gambling problems to inform prevention and intervention efforts. • There is a need for further research to resolve the debate that has emerged in the literature in relation to the measurement of harm. • There is also a clear need to validate the measures of problem gambling for use in population-level screening and to translate the available low-risk gambling limits developed for use in Australia.

Highlighted Australian studies suggested that prevalence surveys conducted by multiple states and territories over the past 15 years show differing rates of gambling participation (averaging 67%) and low-risk gambling (averaging 5.4%), but relatively steady rates of problem gambling (averaging 0.6%) and moderate-risk gambling (averaging 2.0%). In contrast, the second National Study of Interactive Gambling found a doubling of problem gambling and declining participation. Further research is needed to investigate whether these variations in estimates are a result of methodological differences, such as sampling frame, and to investigate the trends of gambling and problem gambling over time. Highlighted studies also suggested a doubling of interactive gambling participation over the last decade (17.5% in 2019/20), estimates of gambling-related harm (9.1% for harm to self and 6.0% for harm from another person's gambling), and rates of family gambling problems (1.7% of households).

Highlighted Australian longitudinal studies found that a range of factors predicted subsequent problem gambling severity, such as persistent weekly binge drinking, tobacco use, cannabis use, multiple financial hardships, overdue household/personal bills, lower ability to pay credit card balances, taking above average financial risks, lower life satisfaction, high psychological distress, and negative major life events.

In relation to the assessment of gambling problems and harm, systematic review evidence concluded that few problem gambling measures have been adequately validated with sufficient methodological quality to be recommended for use in population-level screening. Highlighted Australian studies, however, suggested that gambling harm measures display good psychometric properties and that over-prioritisation (the degree to which gambling is put ahead of other important parts of life) is an early warning sign of the development of gambling-related harm. There was, however, mixed evidence about the influence of binary or more graded scoring methods when measuring gambling-related harm.

Finally, highlighted studies suggested that overall low-risk gambling limits for Australia are:

- gambling frequency of 20-37 times per year
- gambling expenditure of AUD$380-$615 per year
- gambling expenditure as a proportion of gross personal income (0.83-10.3%)
- gambling duration of 400-454 minutes per year, and
- two types of gambling activities per year.

Individual and community level prevention and early intervention

A total of 19 articles/reports examined prevention (k=5), early intervention (k=10) and self-management (k=4).

Key findings	Gaps and implications
• Prevention studies in schools are using innovative methods to train high school teachers to deliver gambling related education. • Early intervention studies indicate screening with personalised feedback was effective when paired with resources and information. • Allied and mental health are receptive to delivering gambling screening and brief intervention. • International studies on self-management indicate frequent use by gamblers and affected others.	• There remain very few early interventions that are delivered via the internet. This gap misses an opportunity to capitalise on increased access, affordability and availability offered by online delivery. • There are currently limited outcome studies on self-management and just one study on self-management of gambling harm by affected others.

Highlighted research on prevention indicated promising new approaches, including the effectiveness of training high school teachers to identify the symptoms, risks and harm factors associated with gambling and gambling disorder.

Consistent with the 2020 gap analysis, the highlighted early intervention articles focused on the effectiveness of internet-delivered interventions, personalised normative feedback and the use of screening tools. A systematic review indicated few early interventions were internet-delivered. Another highlighted review indicated gaps in brief screening and intervention in health care settings, with very few articles examining effectiveness. However, the review identified broad receptivity of services to screening for gambling problems. One Australian study, which examined early

intervention that targeted thinking styles in regular gamblers, reported that a brief intervention delivering weekly self-directed training was promising.

Self-management has continued to be a theme since the 2020 gap analysis. Highlighted studies from Canada, Australia, and New Zealand indicated the frequent use of self-help strategies although gamblers also needed additional support for their implementation. Similarly, one study reported on self-help strategies used by affected others. This New Zealand study indicated that more resources were needed for family members to effectively implement strategies for their own gambling harm and support a person with a gambling problem.

Effectiveness and efficacy of treatments

A total of 46 articles/reports examined this theme, focussed on the effectiveness of treatments (k=37), for whom treatments work (k=11), how and why treatments work (k=2), professional help-seeking preferences and usage (k=5), motivators and barriers for seeking treatment (k=6), and effectiveness of Screening, Brief Intervention and Referral to Treatment (k=3).

Key findings	Gaps and implications
• Most research has focused on the efficacy of treatments for gamblers. • Psychological gambling interventions, such as Cognitive-Behavioural Therapy (CBT) and motivational interviewing (MI) are associated with good outcomes. • Pharmacological gambling interventions demonstrate mixed findings, with the most promising results for opioid antagonists and mood stabilisers. • Internet-delivered and brief interventions also appear promising. • Across multiple definitions (treatment completion, number of sessions, and/or therapist judgement), dropout from psychological gambling interventions is 39.1%. • 6.3% of treatment-seekers show a poor recovery response. • Only a small proportion of gamblers and affected others seek treatment, with a range of motivators and barriers identified. • Brief Intervention and Referral to Treatment is feasible, acceptable and potentially effective.	• Evidence-based practice can be facilitated in the service sector by training clinicians in CBT and MI. • Further research is required to evaluate other forms of psychological treatments that have been effective in treating other disorders, such as mindfulness-based interventions. • Further research is required to explore how we can make internet and mobile treatments more effective, such as adding guidance or other therapeutic components. • Further research is required to evaluate interventions for affected others. • Future efforts are required to support treatment retention and future research is required to evaluate how much is “enough” treatment. • More research is required to explore the factors associated with treatment outcomes, help-seeking preferences and usage, and motivators and barriers for help-seeking for both gamblers and affected others. • Brief Intervention and Referral to Treatment require further evaluation, particularly because it is being used in practice.

Notable findings from a highlighted umbrella review were that psychological interventions demonstrate good treatment outcomes, but that there is mixed evidence for pharmacological interventions. Highlighted Australian studies also suggested there is also promising evidence for internet-delivered and brief gambling interventions. A highlighted systematic review found that over one-third of gamblers drop out of treatment, but that this rate is higher when dropout is defined as attending all sessions (rather than attending a pre-specified number of sessions or when judged by therapists).

One highlighted study conducted in the United Kingdom (UK) found that 18% of gamblers expressed a desire for treatment and 12% of gamblers with harm used some form of treatment, but that 64% of affected others did not seek treatment or support. This study also found that the most common motivators were knowing they could access treatment (gamblers) and safety or wellbeing concerns (affected others); the most common barrier was not considering the gambling a problem (gamblers and affected others). Finally, highlighted systematic review evidence suggested that Brief Intervention and Referral to Treatment is being used in practice and is feasible, acceptable, and potentially effective.

Gambling among vulnerable groups

A total of 72 articles/reports examined gambling among particular vulnerable groups. It focused on youth (k=34), young adults (k=18), culturally and linguistically diverse (CALD) and indigenous (k=14), family violence (k=3) and homelessness (k=2).

Key findings	Gaps and implications
• Most research uses cross-sectional or qualitative study designs and is focused on young adult or youth gambling. • Multiple international longitudinal studies indicate the nature of youth and young adult gambling may be shifting away from traditional forms and towards new technology delivered options. • New frameworks can provide guidance for CALD and indigenous studies in problem gambling.	• There is a need to leverage longitudinal studies involving youth and young adults to determine the rate of gambling and problem gambling transmission. • These findings suggest the need for a move away from qualitative and cross-sectional surveys and towards other designs such as longitudinal studies and interventions, including evaluation of prevention, early intervention and treatment. • There is a need for more studies of CALD and Indigenous people as well as in relation family violence or homelessness.

Consistent with the previous gap analysis, most of the research was cross-sectional studies focused on youth and young adults with minimal research on Australian indigenous and cultural issues. Key issues in youth and gambling were the relationship between simulated gambling and gambling-like games and gambling harm. One highlighted Australian study indicated some harm to youth from simulated gambling. Still, this study showed there was reduced later uptake

of traditional forms of gambling (e.g., Electronic Gaming Machines [EGMs]). Other highlighted studies involving young adults reported gambling behaviours and other problems remained stable between 20 and 24 years, which indicates the importance of early intervention.

CALD and indigenous highlighted studies consisted of a rapid review to guide gambling intervention development and focused on Canada, Australia, and New Zealand. Another highlighted article developed an Australian culturally responsive framework specific to gambling harm that could inform public health and service provision.

Family violence studies, which highlighted two from Australia, indicated high rates of family violence related to problem gambling amongst treatment-seekers and in the community. Finally, homelessness was limited to just two studies that indicated the importance of screening for gambling in homelessness or those with unstable housing.

Emerging technologies and new trends

Forty-six articles/reports examined issues relating to emerging technologies and new trends focussed on emerging technological gambling features and activities (k=31), the relationship between gambling and gaming (k=12), and emerging technologies and trends in payment methods (k=5).

Key findings	Gaps and implications
• Most research explored emerging technological gambling features and activities. • Most of the research into emerging technological gambling features and activities focussed on loot box engagement. • There was a consistent positive association between loot box engagement and gambling problems.	• Research exploring the impact of emerging technologies and trends in payment methods on gambling behaviour is needed. • Research into other emerging technological gambling features and activities, particularly newer forms that have emerged (e.g., cryptocurrency trading) is required. • Prevention and education interventions targeting the link between loot box engagement and gambling problems are needed.

Systematic review and cross-sectional evidence from the highlighted studies consistently demonstrated that those who engage with loot boxes experience greater gambling problems, suggesting the need for prevention interventions that target this association and educate individuals about the relationships between loot box engagement and gambling.

These findings also highlight the need for research into other emerging technological gambling features and activities that may operate in a manner similar to loot boxes (e.g., booster packs in collectible card games), as well as cryptocurrency trading.

Moreover, given most of the research in this area explored emerging technological gambling features and activities and the relationship between gambling and gaming disorders, research exploring the impact of emerging technologies and trends in

payment methods on gambling behaviour is required. Such research is particularly pertinent given the transition to cashless payments due to the COVID-19 pandemic.

Regulation of gambling products, practices and environments

A total of 62 articles/reports examined research relevant to gambling regulation including marketing of gambling (k=13); product characteristics and bet types (k=12); staff training and host responsibility (k=5); consumer protection, responsible gambling tools and strategies (k=16); geographic and time-based accessibility to gambling (k=11); and self-exclusion programs (k=9).

Key findings	Gaps and implications
• Good design is important to uptake and use of responsible gambling tools. • Reduced access to EGM venues is associated with reductions in gambling and harm with little evidence it will result in widespread transference to online gambling. • Patron usage data can be used to identify at-risk gamblers. • Findings of a small, positive relationship between marketing and gambling awareness, behaviour and harms/problems extends to digital marketing.	• More outcome studies are required to test the effectiveness of responsible gambling tools and gambling marketing restrictions. • There is evidence of demonstrated benefit to reductions in EGM gambling opportunities. • Staff training programs to identify signs of gambling problems require clear guidance on approach protocols. • The success of self-exclusion depends on the removal of structural obstacles and integration of evidence-based technology to prevent breaches and support multi-venue sign-up.

Highlighted studies suggested that dynamic and targeted messaging is more effective than static messaging as a responsible gambling strategy. Good design is important to encourage use of responsible gambling tools, however, there is mixed evidence as to whether the use of such tools results in behaviour change, suggesting the need for more outcome-based studies.

Recent studies highlighted in this review found evidence that restricting accessibility to EGM venues can lead to reduced gambling and related harms, with little evidence this leads to widespread transference to online gambling.

Research using patron data to create risk profiles that detect gambling problems show potential in identifying online gamblers at risk. However, as with land-based identification programs, the outcome of identification and approach initiatives on gamblers remains unclear and dependent on appropriate staff response.

A recent systematic review of digital gambling marketing highlighted in the current review supports and extends other evidence regarding the relationship between marketing and gambling awareness, behaviour and harms/problems, showing that digital marketing strategies similarly increase awareness and encourage engagement in gambling, with this type of marketing particularly targeting sports betting, young men and vulnerable groups.

Finally, research again demonstrated that the effectiveness of self-exclusion programs is hampered by structural obstacles and the ability of gamblers to continue

gambling. New technology facilitating multi-venue exclusions may increase uptake and effectiveness of programs and further research should evaluate these and continue to examine the effectiveness of programs to support self-exclusion.

Overall conclusions

Taken together, these results support those of the 2020 gap analysis. They suggest that the body of research is consolidating in some areas but that gaps remain in other areas. There is a need for more research examining specific topics or issues including:

- the measurement of gambling harm and problems;
- temporal relationships between individual, peer/family, and societal factors and gambling problems and harms;
- the impact of emerging technologies and trends in payment methods on gambling behaviour;
- examination of gambling in identified vulnerable groups - CALD, Indigenous people and those experiencing family violence and homelessness.

In addition, there is a need for more outcome studies and more implementation and evaluation research to test evidence-informed interventions and allow evidence to inform translation of research into practice and policy.

Findings from this review, read in conjunction with the prior 2020 gap analysis, has important implications for policy and programs including that:

- Internet delivery of early intervention has the potential to increase reach and access
- Significant rates of dropout from psychological treatment may restrict positive outcomes
- Staff training programs to identify signs of gambling problems require clear industry and governmental guidance on approach protocols
- Structural obstacles to the use of self-exclusion programs must be removed and integration of evidence-based technology is required to prevent breaches and support multi-venue sign-up
- Reduced access to EGM venues may support reduced engagement and harm with little evidence this results in widespread transference to online gambling
- Public health efforts may address barriers to help-seeking
- Prevention interventions are needed to target the association between loot box engagement and gambling problems
- At-risk individuals need to be educated in the convergence between loot box engagement and gambling

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3. Purpose and focus of the summary

The Responsible Gambling Fund (RGF) undertakes a regular review of the gambling literature to inform its research agenda and identify relevant gaps and opportunities. The findings of the Gambling Research Summary 20-21 are expected to inform the RGF's current research agenda and prioritisation of research projects through the Office of Responsible Gambling (ORG) for the period 2021-2024.

The aim of this current review is to map Australian and international gambling research undertaken since the 2020 gap analysis (see Rodda, 2020) in relation to six research themes reflective of the six themes identified in the RGF Research Agenda 2021-2024. In addition, a selection of key gambling studies are highlighted for each theme based on their methodological quality, innovativeness and/or applicability to an Australian audience.

Together, the overall mapping and highlighted studies will demonstrate where new research responds to, and answers, knowledge gaps as well as identifying remaining gaps in evidence and/or knowledge.

The Gambling Research Summary 20-21 is the third in a series of reviews undertaken by the RGF to provide a snapshot of recent research. The broad range of research themes covered is consistent across reviews but specific themes, research questions and methodological approaches differ slightly to respond to, and inform, current research plans and priorities of the RGF.

This third review examines six research themes that reflect priorities of the RGF's Research Agenda 2021-24[2] as follows:

- Gambling prevalence and harm
- Individual and community level prevention and early intervention
- Efficacy and effectiveness of treatments
- Emerging technologies and new trends
- Gambling among vulnerable groups
- Gambling industry products, practices, environments and regulation

The current study uses scoping review methodology covering literature published between 1 January 2020 and 7 September 2021. Diverging from prior methodologies, this review conducted separate but concurrent searches, for each research theme. This approach means that some studies may be included in more than one theme or subtheme. The current review maps all studies published within the search time period and then provides a more detailed examination of key studies within each research theme as agreed between NSW ORG and review authors.

The report has been structured such that a summary of the methodology is in Chapter 4 (full details available in Appendices). Results of the review for each theme is reported in Chapter 5, including a brief overview of key findings from the 2020 gap analysis, a basic mapping of the relevant literature and a discussion of highlighted studies by the previously agreed subthemes. Chapter 6 provides conclusions and implications considering the entirety of the findings. Finally, tables presenting details for all included studies extracted by theme can be found in Chapter 7.

[2] Specific subthemes or areas of focus that responded to RGF priorities were set a priori for each research theme. See Appendix A for details.

4. Methodology

To address the aims of this review, scoping review methodology was employed (Arksey & O'Malley, 2005; Levac, Colquhoun, & O'Brien, 2010). Scoping reviews aim to 'map' key concepts, the size and scope of the evidence base, types of evidence, main findings, and gaps in research to address exploratory research questions. Scoping reviews consist of the systematic search and selection, collection and summarisation of existing knowledge in a broad thematic area and can be used to clarify the conceptual boundaries of a topic. They prioritise a description of the breadth of literature, rather than the in-depth examination of select studies. This approach therefore provides a means of 'mapping' the research activity relating to each of the themes outlined in the aims.

The current scoping review consisted of five stages: (1) development of research themes and subthemes; (2) conduct of systematic search; (3) selection of included studies; (4) data extraction; and (5) data mapping and presentation of the research summary. Each of these stages has been outlined in further detail below.

Stage 1 – Development of research themes

Stage 1 involved the development and refinement of the themes and subthemes through ongoing discussions with the research team and NSW ORG.

Stage 2 – Systematic search

Stage 2 involved the conduct of a systematic search to identify relevant peer-reviewed and grey literature. First, an electronic database search was conducted (PsycInfo, Medline and Web of Science). Given the diversity across the research themes, the electronic database search consisted of separate searches for each theme, with each search using terms related to gambling (e.g., gambl*) and terms specific to each theme. There was variability in the subthemes within the *'Gambling prevalence and harm'* and '*Efficacy and effectiveness of treatments'* research themes, in which both themes address subthemes relating to the screening and assessment of gambling problems or harms; therefore, an additional search was conducted to identify articles that addressed these subthemes. As such, across the six research themes, seven separate electronic database searches were conducted (see Appendix B for these search strategies). Second, one grey literature search of BASE (i.e., open access database of academic web resources) was conducted for all six research themes, using search terms related only to gambling (see Appendix B). Lastly, a targeted key website search was conducted. This included a search of Australian and international agencies and government departments that provide funding for gambling research or provide information on gambling, as well as Australian and international information repositories (see Appendix C for the list of websites). All searches were limited to English language, with the electronic databases search terms further limited to title and abstract only. To ensure all relevant literature published since the previous gap analysis was captured, the systematic search was limited to literature published from January 2020 to 7 September 2021. Literature identified and included in the previous gap analysis was excluded from this review at the selection of included studies stage.

Stage 3 - Selection of included studies

Stage 3 involved the iterative refinement of the eligibility criteria for each theme and the selection of included studies. One researcher screened the title and abstracts of all records identified by the search, with another researcher independently assessing all articles that required full-text assessment for all themes except *'Gambling industry products, practices, environments and regulation'*. A single researcher conducted screening and assessed this theme due to specific expertise required. The eligibility criteria differed for each theme, with some consistent inclusion and exclusion criteria for the overall review (e.g., excluded if published in a language other than English). The eligibility criteria for the overall review and each theme can be found in Appendix D.

Stage 4 - Data extraction

Stage 4 involved the extraction of data from all the included studies into a standardised spreadsheet for each theme. This included basic study information (country, recruitment source, sample type, sample size, age, gender, study design) and information relevant to all research themes (study aims, main findings).

Stage 5 – Data mapping and narrative synthesis of highlighted articles

Stage 5 first involved a brief overview of the available literature in each subtheme (i.e., data mapping), in which key characteristics of the included studies were summarised (i.e., study design, country). This was followed by a narrative synthesis of a select number of articles/ reports within each subtheme to highlight key research within that subtheme. Documents were selected for highlight via a 2-part process: (a) the research team presented NSW ORG with recommendations for articles and reports that could be highlighted within each subtheme based on their methodological quality (e.g., systematic reviews; longitudinal over cross-sectional studies), innovativeness (i.e., addressing a novel aim) and/or applicability to an Australian audience, (b) NSW ORG then provided feedback on preferred articles and reports to highlight that were fit for purpose. Based on this feedback, not all subthemes include a narrative synthesis of highlighted articles and some themes have more highlighted studies than others.

5. Results by research theme

Basic mapping results and research highlight studies are presented by theme below. To support readers, hyperlinks have been provided to free access articles and reports. Details on all mapped studies, including key findings are in Chapter 7[3].

5.1. Measuring and understanding gambling prevalence and harm

Public health frameworks employ a whole-of-population approach to inform policy by identifying the determinants and subsequent harms of problem gambling. While studies estimating gambling participation and problems have been an important source of information for policy makers for many years, the conceptualisation and measurement of gambling-related harm is a more recent, rapidly emerging, and controversial area of research. Understanding both problem gambling severity and harm, which are closely linked but conceptually distinct constructs, is important to inform gambling prevention and intervention policy. Consistent with public health perspectives, the current theme therefore examined the prevalence of gambling participation, problems, and harm in adults; longitudinal risk and protective factors and transitions between levels of risk; and the psychometric properties of new and existing instruments for measuring gambling problems and harms.

Findings from the 2020 gap analysis identified several key research areas exploring gambling prevalence and harm, including:

- gambling participation in adults, which identified overall Australian participation rates (53%-69%)
- at-risk and problem gambling in adults, which identified past-year problem gambling prevalence estimates internationally (0.2%-5.8%) and in Australia (problem gambling: 0.7%-1.0%; moderate-risk gambling: 2.2%-2.8%; low-risk gambling (4.6%-7.0%)
- participation rates for new forms of gambling, which demonstrated increases in past-year online gambling in Australia over time, with estimates ranging from 8.0% to 27.6% and online gamblers more likely to report higher gambling frequencies, gambling problems, and harm
- conceptualisation of harm, in which it was noted that there was little information available on the differentiation of harm between levels of gambling risk, few reliable and valid measures of gambling-related harm, and a need to move beyond estimating the prevalence of harm
- issues in measuring gambling harm, in which there were cost-benefit analyses of gambling, identification of harms across different levels of problem gambling severity and sample types, and the development of a scale to separate harm from dependence.

[3] For Preferred Reporting Items for Systematic Reviews and Meta-analyses extensions for Scoping Reviews (PRISMA-ScR) checklist for this report and flow diagrams associated with each theme see Appendix E and Appendix F, respectively.

Seventy-four articles/reports examined this theme in this current review. Of these, 42 related to prevalence of gambling participation, problems and harm, 10 to longitudinal risk and protective factors and transitions between levels of risk, and 30 to psychometric properties of new and existing instruments for measuring gambling problems and harms[4]. Basic mapping of included studies and research highlights are provided by subtheme below. For details on all mapped studies, including key findings, see Chapter 7.

5.1.1 Prevalence of gambling participation, problems and harm

Mapping

Forty-two empirical studies identified gambling prevalence estimates in adults. These studies employed both cross-sectional (k=31[5]) and longitudinal (k=11) study designs. Most were conducted in the United Kingdom (UK: k=11), Australia (k=7), and Canada (k=5).

Highlighted Research

Findings from four empirical studies are highlighted, which provided estimates of participation, problems, harm, and family gambling problems in Australia. Delfabbro and colleagues provided past-year estimates from Australian gambling prevalence studies using the Problem Gambling Severity Index (PGSI) over the previous 10 years (Delfabbro, King, Browne, & Dowling, 2020) and 15 years (Delfabbro & King, 2021). Tulloch, Browne, Hing, and Rockloff (2020) conducted a nationally representative study of Australians in which the family or household was treated as the unit of analysis. Finally, Hing et al.'s (2021)[6] second National Study of Interactive Gambling in Australia (2019-2020) identified current estimates of gambling participation, problems, and harm and compared these estimates to the first National Study of Interactive Gambling in Australia conducted a decade before (2011-2012).

Gambling Participation

Delfabbro and King (2021) found that, over the last 15 years, an average of 67.1% of adults in Australian prevalence studies have gambled in the previous year. They found, however, that estimates of gambling participation have been quite variable over this period of time, with estimates ranging from 55.0% to 74.7% (Delfabbro & King, 2021). In contrast, Hing et al. (2021) found that the overall rate of gambling participation has decreased from 64.3% in the first National Study of Interactive Gambling in Australia to 56.9% in the second National Study of Interactive Gambling in Australia.

Hing et al. (2021) also found that estimates of interactive gambling (gambling on at least one activity using the Internet), however, have doubled over this time period from 8.1% to 17.5% of adults. Interactive gambling participation was highest for legal online gambling activities, including lotteries, race betting and sports betting, with

[4] Some studies relate to multiple subthemes so the sum total of documents across all subthemes may be greater than total number of articles for any particular theme.
[5] k denotes number of articles and/or reports.
[6] Hing et al.'s 2001 study of interactive gambling was requested for inclusion by NSW ORG but it should be noted it was published in October 2021 (just after the systematic search was conducted).

participation rates less than 1% for all other activities. Moreover, in 2019/20, participation in new forms of gambling, such as esports betting, fantasy sports betting, and skin gambling, was relatively low, with rates of less than 1.0%. The exception was loot box purchasing, in which 2.7% of the population participated. Compared to non-interactive gamblers, interactive gamblers were more likely to report higher gambling frequencies and expenditures on many gambling activities, problem gambling, moderate-risk gambling, low-risk gambling, and at least one gambling-related harm to self. However, over half of interactive moderate-risk or problem gamblers identified land-based gambling as the primary gambling medium responsible for their gambling problem.

Gambling Problems

Delfabbro and colleagues (Delfabbro et al., 2020; Delfabbro & King, 2021) reported that estimates of problem gambling have been very consistent across states and territories and over time, with an average of 0.6% of adults being classified in the problem gambling category over the last 15 years. In contrast, Hing et al. (2021) found that problem gambling estimates doubled from 0.6% to 1.23% from two cross-sectional national studies conducted a decade apart. They suggested that the margins of error for the estimates from both surveys indicates this is a statistically significant increase. They also argue that similarities to other surveys, such as the Household Income and Labour Dynamics in Australia Survey (HILDA) and the most recent NSW survey, increase their confidence in this prevalence estimate. They did, however, acknowledge that this estimate is lower than those identified in most other recent state and territory gambling prevalence surveys; and suggest that methodological differences, such as sample size, sampling frame, sub-sampling protocols and time of survey may explain variations between this and previous estimates. Specifically, they highlight the use of dual sampling frames of mobile and landline telephone numbers in most state and territory surveys and the use of a mobile-phone only sampling frame in the second National Study of Interactive Gambling.

Both the Delfabbro and colleagues (Delfabbro et al., 2020; Delfabbro & King, 2021) and Hing et al. (2021) studies agree that moderate-risk gambling has been very consistent across time. Delfabbro and King (2021) found that an average of 2.0% of adults across all states and territories have been classified in the moderate-risk gambling category over the last 15 years. Hing et al. (2021) also found that moderate-risk (3.1%) gambling has remained steady across the last decade.

Delfabbro and King (2021) found that estimates of low-risk gambling have been variable across states and territories and over time, possibly to due differences in sub-sampling and scoring procedures. They found that an average of 5.4% of adults have been classified in the low-risk category over the past 15 years, but that estimates have ranged from 1.0 to 8.9%. Interestingly, Hing et al. (2021) found that but that low-risk (6.6%) gambling remained steady from the first to the second National Study of Interactive Gambling.

Finally, treating the household as the unit of analysis, Tulloch et al. (2020) found that 1.7% of Australian households reported a past-year family gambling problem. In this study, Western Australia was under-represented across the states/territories.

Gambling Harm

Finally, Hing et al. (2021) was the only highlighted study to report estimates of gambling-related harm in Australian adults. In this study, approximately 9.1% of adult Australians reported at least one gambling-related harm to self and 6.0% reported harm from another person's gambling.

5.1.2 Longitudinal risk and protective factors and transitions between levels of risk

Mapping

Ten article/reports explored longitudinal risk and protective factors and transitions between levels of risk. These studies were mostly conducted in Australia (k=4) and the UK (k=3).

Highlighted research

Two empirical studies are highlighted, which investigated the degree to which psychological, social, health, and economic factors predict subsequent problem gambling severity.

Using Australian Temperament Project (ATP) data across seven waves, Merkouris et al. (2021) found that persistent weekly binge drinking, tobacco use and cannabis use across adolescence (13-18 years) to young adulthood (19-28 years) was associated with any-risk gambling (i.e., low-risk, moderate-risk, or problem gambling) in adulthood (31-32 years). To a lesser extent, weekly binge drinking and tobacco use beginning in young adulthood also predicted any-risk gambling in adulthood. In contrast, mental health symptoms (depressive and anxiety symptoms) were not associated with subsequent any-risk gambling; and there were no sex differences in any relationship. It was concluded that substance use behaviours that begin during young adulthood or have persisted from adolescence to young adulthood likely play a role in the aetiology of gambling problems in adulthood and that interventions targeting substance use across these earlier developmental periods may facilitate the prevention of developing subsequent gambling problems.

Paterson, Taylor, and Gray (2020) employed HILDA data across 15 waves to explore the degree to which social, health and economic factors predicted subsequent gambling problems. Compared to non-problem gamblers in wave 15, people with problem gambling, and moderate-risk and low-risk gambling to a lesser extent, were more likely to report multiple financial hardships, overdue household/personal bills, lower ability to pay credit card balances, taking above average financial risks, lower life satisfaction, high psychological distress, and negative major life events in the preceding waves. It was concluded that lower social, health, and economic wellbeing go back a number of years, which may indicate increasingly risky gambling behaviour or the cumulative effects of sustained gambling problems.

5.1.3 Psychometric properties of new and existing instruments for measuring gambling problems and harms

Mapping

Thirty articles/reports explored the psychometric properties of new and existing instruments for measuring gambling problems and harms: two systematic reviews and 28 empirical studies, mostly using cross-sectional (k=23) and longitudinal (k=2) study designs. Most of these studies were conducted in the United States of America (USA: k=5), Australia (k=4), Turkey (k=4), and Sweden (k=4).

Highlighted Research

One systematic review evaluating the accuracy of assessment instruments for problem gambling to inform decision-makers about choices for population-level screening (Otto et al., 2020), three empirical studies exploring the psychometric properties of measures of gambling harm (Delfabbro, Georgiou, & King, 2021; McLauchlan, Browne, Russell, & Rockloff, 2020; O'Neil et al., 2020), and five empirical studies identifying Australian low-risk gambling limits (Dowling, Greenwood, et al., 2021; Dowling, Youssef, et al., 2021a, 2021b) were selected for highlighting.

Assessing Problem Gambling

Otto et al. (2020) identified 31 instruments from 60 studies but only three studies evaluating the South Oaks Gambling Screen (SOGS), PGSI, and Massachusetts Gambling Screen (MAGS) were included. This is due to stringent inclusion criteria requiring that studies validate an instrument with a semi-structured interview. In terms of sensitivity (ability to correctly classify individuals with gambling disorder), the SOGS performed best (99%), followed by the PGSI (67%), and the MAGS (34%). In terms of specificity (ability to correctly classify individuals without gambling disorder), the MAGS (99%) and the PGSI (92%) performed best, followed by the SOGS (22%). In terms of positive predictive values (individuals identified as having gambling disorder who would actually have the disorder), the MAGS performed best (41%), followed by the PGSI (15%) and the SOGS (3%). In terms of negative predictive values (individuals identified as not having gambling disorder who would not actually have the disorder), all instruments performed equally well (99%). It was concluded that few measures have been adequately validated with sufficient methodological quality to be recommended for use in population-level screening.

Measuring Gambling Harm

In response to concerns that the binary scoring method used by the SGHS is inferior to measures that elicit the severity of harm, McLauchlan et al. (2020) compared the psychometric properties of the SGHS associated with using Likert and binary response scoring. Although there was a general pattern of the Likert method performing slightly better than the binary method, there were no significant differences on the internal consistency, test-retest, alternate-form reliability, and convergent or discriminant validity of the SGHS. The Likert method did, however, correlate significantly higher with the PGSI than the binary scoring method, which was explained by the Likert method allowing for the detection of the more extreme harm that the PGSI is designed to identify. The authors tentatively concluded that changing the format of the scoring methods of the SGHS from binary to Likert had a negligible influence on its psychometric properties. These findings contrast to those of Delfabbro, Georgiou, et al. (2021), who adapted the Harms Checklist to be scored using a graded severity rating scale that also allowed for each harm to be attributed to gambling. They found that the measurement of harm and its estimated distribution over gambling risk categories was sensitive to the method of measurement, whereby ‘softer scoring methods’ (binary or ‘any harm’) identified a greater proportion of harms than ‘stricter scoring methods’ (graded scoring or harm attribution to gambling).

In the third highlighted study measuring harm, O’Neill et al. (2021) examined the psychometric properties of the 10-item Gambling Harm Measure (GHM), an

alternative measure of harm that attempts to capture the severity of harms. The GHM measures multiple domains: over-prioritisation; strains and pressures; and severe harms. Over-prioritisation (the degree to which gambling is put ahead of other important parts of life) refers to the indirect or opportunity cost of gambling but tries to reduce conflating harm with simple substitution effects in lower-risk gamblers. The authors argue that although over-prioritisation may be conceptualised as a precursor to harm, it is consistent with broader public health approaches that focus beyond very severe and infrequent harms. The GHM displayed good internal consistency. GHM scores were positively related to PGSI scores, with some evidence of a J-shaped relationship, suggesting the endorsement of harms rises in a non-linear rate as one moves up the PGSI categories. Almost 79% of the total harm score was attributable to moderate-risk and problem gambling, with severe harm rarely observed in any category apart from problem gambling. It was concluded that over-prioritisation is an early warning sign of the development of gambling-related harm.

Low Risk Gambling Limits

Dowling and colleagues conducted a series of studies designed to empirically derive a set of Australian low-risk gambling limits (Dowling, Greenwood, et al., 2021; Dowling, et al., 2021a, 2021b). Taken together, these studies derived similar limits (with moderate classification accuracy) from multiple Australian states and territories using different measures of harm (PGSI and Short Gambling Harms Screen [SGHS]). These limits were: gambling frequency of 20-37 times per year; gambling expenditure of AUD$380-$615 per year; gambling expenditure as a proportion of gross personal income (0.83-10.3%); gambling duration of 400-454 minutes per year; and two types of gambling activities per year.

These limits, which are generally at the lower end of the range identified in previous Canadian studies, did not differ by sex or age (Dowling et al., 2021a). All limits, with the exception of number of gambling activities, predicted subsequent harms (Dowling et al., 2021a). Gamblers exceeding these limits were 3-20 times more likely to experience harm than those who did not; and had a 5-30% risk of experiencing harm (Dowling et al., 2021a; Dowling, Greenwood et al., 2021). Only 7-12% of gamblers exceeding the limits actually experienced harm (Dowling et al., 2021a). Limits relating to gambling expenditure were consistently the best-performing (Dowling et al., 2021a; Dowling, Greenwood et al., 2021). Gambling consumption under the limits also conferred a considerable amount of harm (Dowling et al., 2021a). There were also negligible differences in limits that were obtained using a definition of harm in which at least two harms across different domains (e.g., financial and relationship) were endorsed compared with limits that were obtained using a definition of harm in which at least two harms from any domain were endorsed (Dowling, Greenwood, et al., 2021).

Although not all activity-specific limits displayed acceptable classification accuracy, these studies have also identified proposed limits for most activities (Dowling et al., 2021b; Dowling, Greenwood et al., 2021).

5.1.4 Conclusions and implications

Findings indicate that, since the previous gap analysis, the majority of the research in this theme has focused on identifying prevalence estimates, with fewer studies exploring the psychometric properties of instruments for measuring gambling problems and harm. This is consistent with the previous gap analysis, in which there

was more emphasis on the identification of prevalence estimates than the measurement of harm. Over the past 15 years, multiple state and territory prevalence surveys have revealed variable rates of gambling participation (averaging 67%) and low-risk gambling (averaging 5.4%), but relatively steady rates of problem gambling (averaging 0.6%) and moderate-risk gambling (averaging 2.0%). In contrast, two cross-sectional national studies conducted ten years apart found declining overall gambling participation rates, a doubling of problem gambling and interactive gambling estimates, and relatively steady rates of moderate-risk and low-risk gambling. Increasing problem gambling in the context of declining participation rates may suggest that those who gamble may be more likely to experience problems. Methodological differences, however, such as sample size, sampling frame, sub-sampling protocols, and scoring protocols may explain these variations in estimates.

The current systematic search identified few studies that explored transitions across the continuum of risk or harm over time or temporal relationships between problem gambling and other factors. The few available studies that examined temporal relationships focussed on individual-level factors, highlighting the need for further longitudinal or prospective event-level research to inform prevention and intervention efforts, particularly in relation to factors that extend beyond the individual (e.g., peer, family, and societal factors). This is especially important given the exacerbation of a range of life stressors resulting from the COVID-19 pandemic, many of which are risk factors for the development of gambling problems and harm.

The search also identified seven studies that continued the debate that has emerged in relation to the measurement of harm, including the degree to which the SGHS's less severe problems reflect rational opportunity costs rather than genuinely harmful consequences and the influence of binary or more graded scoring methods, as well as the development of new measures of harm, suggesting the need for further research to resolve these measurement issues. There is also a clear need to validate measures of problem gambling for use in population-level screening and to translate the available low-risk gambling limits that have been developed for use in Australia.

5.2. Individual and community level prevention and early intervention

Prevention and early intervention refer to gambling-related prevention, education, school-based training, and interventions that target gamblers before developing problems. Estimates of gambling harm suggest that people at low and moderate risk hold the burden of harm. Therefore, prevention and early intervention target people who are either not yet gambling (e.g., school-aged) or have started gambling to pre-empt gambling harm from developing. The current theme included prevention interventions delivered to young people or youth, including school-based education. It also included early intervention but only where the intervention was self-initiated such as self-management or conducted outside gambling venues (e.g., brief interventions in community settings).

The 2020 gap analysis identified several key research areas relevant to the current chapter. These included:

- prevention and schools, which demonstrated some promise for longer-duration programs with a reduction in the frequency of gambling, but there was a need for longer-term evaluation
- early intervention including education and limit setting, which focused on brief interventions such as personalised normative feedback delivered away from gambling venues that could assist gamblers to set and stick to limits
- self-management strategies, which reported frequent use of strategies but limited research on their impact of effectiveness.

- The findings from the 2020 gap analysis indicated a lack of empirical studies for prevention in Australia, with minimal research on prevention with adult samples outside of gambling venues. There was a reliance on cross-sectional survey methodology without comparison groups for early intervention and self-management.

In this current review, nineteen articles examined prevention and early intervention. Of these studies, five examined prevention,10 related to early intervention and four related to self-management. Basic mapping of included studies and research highlights are provided by subtheme below. For details on all mapped studies, including key findings, see Chapter 7.

5.2.1 Prevention

Mapping

Five studies explored prevention, including one systematic review, one randomised controlled trial (RCT), two single-arm trials and one cross-sectional study. These studies originated in Europe, including Spain, Sweden, and Italy. All studies were conducted in schools and targeted adolescent samples (<18 years), with one study also delivering an intervention to teachers.

Highlighted Research

Two empirical studies were selected for highlighting, which investigated school-based prevention.

Chóliz, Marcos and Bueno (2021) evaluated the impact of a gambling prevention program in Spain with 2372 adolescents aged 14-19 years of age. The intervention aimed to provide information on the symptoms, harms and risk factors associated with gambling and gambling disorder and prompt a change in attitude towards gambling. The pre-post intervention with one-month follow-up evaluation was delivered by a psychologist trained in the protocol in two sessions and small group settings (15-20 students). Participants were recruited from high schools in 19 Spanish cities and towns, and the intervention was delivered to 132 small groups of students. Chóliz et al. reported pre-post testing indicating a significant reduction in the monthly frequency of gambling, percentage of adolescents with risky gambling, and percentage of adolescents with gambling disorder. The authors conclude that the intervention was effective in reducing gambling behaviours and suggest that it should be adapted so that teachers could administer the program rather than external psychologists.

Tani, Ponti, Ghinassi, and Smorti (2021) evaluated the effectiveness of a gambling prevention program in Italy with 393 adolescents aged 13 to 19 years of age (84% male). The study's primary aim was to develop a gambling intervention for students through the training of high-school teachers and to assess the impact of the intervention on students through improved gambling knowledge and reduced gambling behaviours of adolescents. The intervention randomised 33 teachers to training (or no training) for 16 hours delivered in four-hour blocks. The four modules included (i) improving knowledge of gambling and gambling disorder, (ii) understanding persuasive messages that characterise gambling advertisements, (iii) improving knowledge of erroneous beliefs and cognitive distortion and (iv) training teachers to identify patterns of gambling disorder in their students. Results indicated that trained teachers improved their knowledge of gambling types, characteristics, and related risks. At a seven-month follow-up evaluation, students reported reduced gambling behaviour, cognitive distortions, and misconceptions related to the economic profitability of gambling. The authors conclude that the intervention results were promising, and further empirical testing involving more structured student-facing interventions and more schools and teachers was required.

5.2.2 Early intervention

Mapping

Ten studies explored early intervention, including three systematic reviews, four RCTs, two single-arm trials and one cross-sectional study. The majority of these studies were from Australia (n=4), with two from New Zealand, two from Canada, and one from the USA and UK. Of the empirical studies, six involved gamblers and one involved people interested in supporting others with Mental Health First Aid when there was a gambling problem.

Highlighted Research

Four studies were selected for highlight including three systematic reviews and one empirical study.

Screening for gambling-related harm in health settings

Blank, Baxter, Woods and Goyder. (2021b) examined the use of screening for gambling-related harm in health care and support settings as a method of providing brief intervention. This study is discussed in more detail within subtheme 6 of *Efficacy and effectiveness of treatment* because Screening, Brief Intervention and Referral to Treatment is a comprehensive, integrated, public health approach to the delivery of early intervention and treatment services for persons with gambling disorders as well as those who are at risk of developing this disorder.

Internet-delivered Prevention and Early Interventions

Rodda (2021) conducted a systematic review of internet-delivered intervention for gambling prevention and early intervention. The systematic review identified 15 studies published between 2000 and 2020, with just one study focused on prevention and seven on early intervention, with the remaining seven on harm reduction. The content of interventions relevant to the current theme was (i) personalised (normative) feedback; (ii) limit setting; and (iii) self-directed cognitive and behavioural therapy, which were delivered via email, websites and self-help

modules. The author concluded that the limited number of studies indicate lost opportunities to leverage technology to prevent and reduce gambling harm.

Personalised Normative Feedback

Saxton, Rodda, Booth, Merkouris and Dowling (2021) conducted a systematic review and meta-analysis on personalised normative feedback (PNF) for various addictions. A total of 34 studies were identified targeting alcohol (k=28), gambling (k = 3), cannabis (k = 3) and tobacco (k=0). PNF alone, and with additional interventions, reduced short-term alcohol frequency and symptom severity. However, these findings were not consistent for gambling where PNF was only effective when delivered with additional interventions such as self-help and effectiveness was limited to reductions in short-term gambling symptom severity. The authors concluded that more studies were needed to determine the efficacy of self-directed PNF for gambling, including studies that test the intervention with and without professional involvement.

Targeting Gamblers' Cognitions

Armstrong et al. (2020b) examined the impact of a brief intervention targeting thinking styles in gamblers. The intervention recruited 94 regular gamblers and randomised to the intervention or a control group. The intervention delivered a weekly self-directed interactive task that involved answering a series of questions related to gambling thinking styles. The study reported that the intervention was associated with significantly fewer erroneous cognitions, greater endorsement of protective cognitions, and reduced time spent gambling post-intervention compared to baseline. The authors concluded that a brief intervention might be a helpful early intervention because it can challenge gambling beliefs by encouraging critical thinking about how gambling works and how it might impact thinking styles.

5.2.3 Self-management

Mapping

Four studies explored self-management, including one systematic review, two longitudinal studies and one qualitative study. One study originated in Canada and one each from Australia, New Zealand and the USA. The results included one systematic review (Peterson et al., 2021) on self-management for addictive behaviours (referred to as protective behavioural strategies) that mapped intervention types that contained self-management strategies. Eight categories of interventions with varying effectiveness, including brief motivational Interventions, personalised normative feedback, and skills-based training.

Highlighted Research

Three empirical studies were selected for highlighting, with two investigating self-management by gamblers and one study on self-management by affected others.

Self-management by Gamblers

S. R. Currie et al. (2020) surveyed 10,054 Canadian adults on the use of self-help strategies and their relationship with sticking to limits. Participants were recruited via a market research online panel and administered a nine-item measure of self-help strategies that predominantly focused on pre-venue (e.g., set a limit) and in-venue strategies (e.g., limit alcohol). The most frequently used strategies were predetermined spending limits, self-monitoring and limiting alcohol consumption.

People with greater gambling severity, involvement and proportion of income spent on gambling used more strategies. The authors concluded that public health interventions that help gamblers use strategies effectively are warranted.

Bagot, Cheetham, Lubman, and Rodda (2020) conducted a longitudinal survey with 411 gamblers from Australia to determine the predictors of self-management strategies. This study administered a list of 99 different strategies, grouped into 15 different categories (e.g., avoidance, alternatives, social support). They reported 92% of gamblers had implanted at least one strategy over the past month (median 30/99). Gamblers indicated a positive attitude towards using strategies and believed that they had control over their implementation. However, the study found perceived low expectations from significant others. The authors concluded that self-management for limiting gambling should focus on strengthening intention to use strategies with opportunities to prompt significant others to support strategy selection and implementation.

Self-management by Affected Others

Booth et al. (2021) developed a data-driven taxonomy of the types of self-help used by affected others. Data was sourced from 329 websites and grouped into family-focused and gambler-focused self-help. Family-focused self-help included 16 techniques ranging from pre-decisional (e.g., pros and cons, coming to a realisation), post-decisional (e.g., goal setting, establishing coping plans) and actional phase (e.g., stress and financial management, avoidance, social and professional support). Frequently reported strategies were financial management and reinforcing desired behaviour change. The gambler-focused taxonomy included 11 techniques to support someone to change their gambling behaviours, including providing feedback on their gambling behaviours, establishing financial and cash controls, and prompting professional help. The authors concluded a gap for intervention and resource development that includes a wide range of specific techniques that affected others can utilise.

5.2.4 Conclusions and implications

Findings indicate that, since the previous gap analysis, most research within this theme has focused on early intervention, with very few studies on prevention or self-management. These findings are consistent with the previous gap analysis, which indicated more emphasis on adult populations than prevention in schools or adult populations. The current systematic review search identified five studies that examined prevention. These indicated that training teachers to deliver content on gambling and problem gambling was an effective way of changing gambling behaviours in school-aged adolescents. Consistent with the previous review, no published prevention studies originated in Australia, highlighting a continued and significant knowledge gap. The evidence presented for early intervention consisted primarily of systematic reviews that indicated further opportunities for intervention development. Gaps were identified in terms of using the internet to deliver early intervention, which could increase reach, ease of dissemination and access for many people. Other gaps were related to screening and brief intervention delivery through health and other addiction services. The review indicated that screening and brief intervention were feasible and acceptable but had few evaluations. The evidence presented for self-management indicated widespread use of techniques and an opportunity to package techniques into evidence-based interventions for further evaluation. These findings suggest the need for Australian studies in prevention and

early intervention that leverage internet delivery and for adolescent and adult populations at risk for gambling problems.

5.3. Efficacy and effectiveness of treatments

There is international consensus that treatments for gambling and affected others be evidence-based. It is therefore critically important for key stakeholders to consider the quality of evidence associated with different intervention options when they are making decisions. Although a range of psychological and pharmacological gambling interventions have been evaluated, there is much less evidence relating to aspects of gambling interventions other than efficacy; or the efficacy of treatments for affected others. The current theme therefore examined the effectiveness of treatments, for whom treatments work, how and why treatments work, professional help-seeking preferences and usage, motivators and barriers for seeking treatment, and effectiveness of Brief Intervention and Referral to Treatment.

Findings from the 2020 gap analysis identified several key research areas exploring efficacy and effectiveness of treatments, including:

- effectiveness, which demonstrated generally poor effectiveness
- help-seeking, in which treatment-seekers reported increases in mental health issues and online gambling; and gamblers may be active help-seekers
- Cognitive Behavioural Therapy (CBT), which consistently demonstrated significant improvements in a range of outcomes
- e-therapy and telephone counselling, which demonstrated promising outcomes, displayed good acceptability, and reduced barriers to access
- pharmacotherapy, with opioid antagonists and mood stabilisers demonstrating the best outcomes
- novel and new treatment approaches, in which mindfulness-based interventions demonstrated moderate to large effects on gambling outcomes
- affected others treatment, which demonstrated mixed findings; and that affected others desire both gambler- and family-focused approaches
- improving access, in which the need to consider the role of rural-specific treatment barriers was highlighted; and a range of motivators were identified
- factors that influence treatment success and engagement, which indicated high rates of treatment dropout; and identified a range of client and treatment factors associated with dropout.

In this current review, forty-six articles/reports were identified that examined this theme focussed on the effectiveness of treatments (k=37), for whom treatments work (k=11), how and why treatments work (k=2), professional help-seeking preferences and usage (k=5), motivators and barriers for seeking treatment (k=6), and effectiveness of Screening, Brief Intervention and Referral to Treatment (k=3). Basic mapping of included studies and research highlights related to 5 subthemes are shown below. For details on all mapped studies, including key findings, see Chapter 7.

5.3.1 The effectiveness of treatments

<u>Mapping</u>

Thirty-seven articles/reports explored the effectiveness of treatments: one umbrella review (systematic review of systematic reviews), seven systematic reviews, and 29 empirical studies mostly using case studies (k=5), randomised trials (k=5), treatment statistics (k=5), chart reviews/audits (k=4), and single-arm designs (k=4). Most were conducted in the UK (k=7) and Australia (k=6).

Highlighted Research

An umbrella review examining the efficacy of pharmacological or psychosocial gambling treatments, a systematic review examining dropout in psychological treatments, and two Australian empirical studies evaluating internet-delivered and brief gambling interventions were highlighted.

The Efficacy of Pharmacological and Psychological Gambling Treatments

The umbrella review (Di Nicola et al., 2020), which was designed to evaluate the efficacy of pharmacological or psychosocial gambling treatments, included 26 systematic reviews. The majority of these systematic reviews included studies that compared interventions with a placebo condition or any comparison group. Psychological interventions were associated with reductions in gambling symptoms, but pharmacological interventions displayed mixed findings. There were promising findings for CBT, Motivational Interviewing (MI), opioid antagonists and mood stabilisers in reducing gambling-related symptoms and/or behaviour, but less convincing evidence for the use of antidepressants. Finally, the findings suggested that the majority of systematic reviews were either of critically low or low quality.

Psychological Treatment Dropout

In a systematic review of 24 studies in which dropout was defined in different ways (i.e., treatment completion, attending a pre-specified number of sessions, or therapist judgement), Pfund et al. (2021) found that the average estimate of dropout from psychological therapies was 39.1%, with considerable variability in estimates (0%-72%). Lower rates were associated with being married, but not with prescribed treatment length, study publication year, average age, gender, employment status, or gambling severity. Dropout rates were significantly higher in studies conducted in Sweden, UK, and USA (cf. Australia/China), when dropout was defined as attending all sessions (cf. attending a pre-specified number of sessions or when judged by therapists), and in non-treatment-seeking samples (cf. treatment-seeking samples). There were no significant differences in estimates according to study design (randomised cf. non-randomised), treatment format (individual, group, or combined), or treatment modality (CBT, MI, or combined). The literature was characterised by inadequate reporting; and it was concluded that future research evaluate how much is “enough” treatment.

Internet-delivered Treatment

Dowling, Merkouris, et al. (2021) conducted a two-arm, parallel-group, randomised trial with pragmatic features with 206 Australian participants to examine the effects of adding therapist-delivered guidance via email to an internet-delivered CBT gambling program (GAMBLINGLESS). Participants in both the guided and unguided conditions reported significant improvements in gambling symptom severity, urges, frequency, expenditure, and psychological distress. Guidance resulted in some additional benefits, particularly in relation to urges, gambling frequency, and quality of life. At the end of the two-year evaluation, 69% of participants reported clinically significant changes in gambling symptom severity, with the guidance group reporting somewhat

higher rates of change (77% cf. 61%). It was concluded that providing guidance may offer some advantages but that further research establishing when and for whom human support adds value is required.

Brief Interventions

Finally, based on a review of crisis interventions and 19 key informant interviews, Oakes, Manning, Rodda, and Lubman (2020) a developed a brief six-step crisis gambling intervention that seeks to reduce distress and increase motivation and readiness to engage in treatment. The steps span identifying and measuring distress, normalising and minimising distress, optimising motivation for change via teachable moments, fostering hope, re-measuring distress, and exploring treatment options. Clinicians who trialled the intervention at an Australian gambling helpline reported positive feedback, whereby the intervention appeared to enable clients to meaningfully engage in help-seeking.

5.3.2 For whom treatments work

Mapping

Eleven articles explored for whom treatments work: two systematic reviews and nine empirical studies using chart reviews/audits (k=5), randomised trials (k=3), and single-arm designs (k=1). These studies were mostly conducted in Spain (k=3) and Australia (k=2).

Highlighted Research

One empirical study by Granero, Valero-Solis, et al. (2020) was highlighted, which estimated response trajectories across a six-month follow-up period following a 16-week course of outpatient group CBT in Spain in 192 young men with gambling disorder. Three trajectories were identified: severe gambling disorder and good evolution to recovery (n=118); moderate-severe gambling disorder and good evolution to recovery (n=62); and severe gambling disorder and poor evolution to recovery (n=12). Predictors of poor outcomes in Trajectory 3 included low education, socioeconomic status, and self-directedness, as well as high gambling severity, global psychopathology/ emotional distress, and harm avoidance. While the first and second trajectories did not differ in sociodemographic variables and age of gambling disorder onset, the second trajectory displayed lower gambling disorder severity, global psychopathology, novelty seeking and harm avoidance, as well as higher persistence, self-directedness, and cooperativeness. While the lack of a control group prohibits the establishment of causal relationships, it was concluded that patient presenting issues likely impact the efficacy of treatment.

5.3.3 How and why treatments work

Mapping

Two articles explored how and why treatments work: one chart review conducted in Canada and one RCT conducted in the USA. No articles were selected for highlighting in this subtheme but key findings can be found in Chapter 7.

5.3.4 Subtheme 4: Professional help-seeking preferences and usage

Mapping

Five reports using cross-sectional online panel data, conducted in the UK, explored professional help-seeking preferences and usage.

Highlighted Research

One report by Gunstone and Gosschalk (2020b) was highlighted which explored professional help-seeking preferences and usage in the UK using a national panel survey. Overall, 18% of gamblers expressed a desire for any treatment or support/advice, wherein gamblers with low-risk and moderate-risk problems preferred informal support and people with gambling problems preferred formal treatment. Gamblers wanted treatment from mental health services (5%), specialist face-to-face treatments (4%), social/youth/support workers (4%), other addiction services (2%), online therapy (2%), general practitioners (GPs) (2%), and self-help tools (2%). In terms of past-year treatment usage, 12% of gamblers experiencing some level of gambling harm used any type of treatment, 13% reported using less formal support/advice, and 17% used treatment and/or support/advice. Treatment usage was similar among men and women, but higher among younger gamblers compared to their older counterparts; and people with gambling problems compared to those with moderate- or low-risk problems. The most used services included mental health services (5%), GPs (4%), social/youth/support workers (4%), specialist face-to-face treatment (3%), other addiction services (2%), support groups (2%), online gambling therapy (1%), and self-help apps or tools (1%).

In contrast, 46% of affected others expressed a desire for any treatment or support/advice, with a stronger preference for informal (36%) over formal (21%) services. Most affected others (64%), however, did not seek treatment or support in the previous 12 months. Affected others tended to seek support on behalf of someone with a gambling problem rather than for themselves. Of those seeking treatment for themselves, 16% used formal treatment, such as mental health services, GPs, and specialist face-to-face services, compared to 19% who used less formal support/advice. Caution is required in the interpretation of the findings of this study, given the non-representative nature of this survey.

5.3.5 Motivators and barriers for seeking treatment

Mapping

Six articles/reports explored motivators and barriers for seeking treatment: four reports using cross-sectional online panel data, conducted in the UK, as well as one RCT and one case series conducted in the USA.

Highlighted Research

Gunstone and Gosschalk's (2020b) national UK study was also highlighted in this subtheme. The findings revealed that 28% of gamblers experiencing some level of harm endorsed one or more motivators for seeking treatment, including knowing they could access treatment (12%), that treatment would be easy to access (10%), a partner/family member (9%) or GP (1%) speaking about it, and knowing that treatment was confidential (8%), free (8%) or available (7%). Gamblers reported the following barriers: not considering gambling a problem (45%); thinking that treatment was irrelevant/unsuitable (31%), not helpful (8%), or inaccessible (5%); positive gambling impacts (e.g., social connection, making money) (21%); stigma (11%); and not knowing enough about treatment (3%) or feeling overwhelmed by treatment

(3%). In contrast, affected others were most commonly prompted to seek treatment due to safety or wellbeing concerns (65%), needing help or not knowing how to manage the gambling (57%), relationship/family impacts (54%), mental health problems (51%), financial impacts (41%), and severe negative impacts (34%). Affected others reported the following barriers: not considering gambling a problem (43%); thinking that treatment would not be helpful (40%), relevant/suitable (38%), or accessible (9%); negative consequences (e.g., betrayal; 18%), positive gambling impacts (14%), and stigma (14%). Caution is required in the interpretation of these findings, given the non-representative nature of this survey.

5.3.6 Effectiveness of Brief Intervention and Referral to Treatment

Mapping

Three articles explored the effectiveness of Brief Intervention and Referral to Treatment: one systematic review, as well as one RCT and one single-arm pilot trial, both conducted in the USA.

Highlighted Research

The systematic review by Blank et al. (2021b) was highlighted, which aimed to evaluate the effectiveness of Brief Intervention and Referral to Treatment in health, care and support settings on gambling behaviours and service use. This review identified three studies that suggested that Brief Intervention and Referral to Treatment interventions delivered in general practice (repeat visits and written advice), mental health services (use of screening instruments to identify risk), and substance abuse treatment services (intensive outpatient treatment or methadone maintenance) are potentially effective, as well as six qualitative studies supporting the acceptability and feasibility of such interventions. Thirteen reports identified from the grey literature described the implementation of Brief Intervention and Referral to Treatment interventions based on those developed for substance abuse (online toolkits, training materials, webinars, websites and links to PDF reports), suggesting these interventions are being used in practice, despite the absence of an evidence base for gambling populations. The authors concluded that health, care and support services are potentially important settings in which to conduct Brief Intervention and Referral to Treatment for gambling but that further evaluation of these interventions appears warranted.

5.3.7 Conclusions and implications

Research indicates that, since the previous gap analysis, the majority of the research within this theme has focused on the efficacy of treatments for gamblers, with fewer studies exploring the factors associated with treatment outcomes, help-seeking preferences and usage for gamblers, and motivators and barriers for help-seeking. This is consistent with the previous gap analysis, in which there was more emphasis on the effectiveness of psychological and pharmacological treatment than help-seeking preferences and factors influencing treatment success and engagement. Moreover, there were few studies that explored these issues for affected others. Given that affected others comprise a considerable proportion of those seeking treatment from specialist gambling services, these findings suggest the need for further research to inform intervention efforts for this important subgroup of treatment-seekers.

The findings revealed support for psychological interventions, such as CBT and MI, but mixed findings for pharmacological interventions. Internet- and brief interventions

also appear promising. The implications of these findings are that we can facilitate evidence-based practice in our services by training clinicians in CBT and MI. Further research, however, is required to evaluate other forms of psychological therapies that have been effective in treating other disorders, such as third-wave or mindfulness-based interventions. Moreover, further research on how we can make internet and mobile treatments most effective, such as adding guidance or other therapeutic components, is required. Dropout from psychological interventions, however, is high, which may be explained by a proportion of treatment-seekers demonstrating a response to treatment that is characterised by a poor evolution to recovery. These findings indicate a need for future efforts to support continued treatment and further research to explore how much is "enough" treatment. Only a small proportion of gamblers and affected others, however, seek treatment. This is usually in response to knowing they could access treatment (gamblers) and safety or wellbeing concerns (affected others). The most common barrier for both gamblers and affected others, however, was not considering the gambling a problem, which highlights a need for public health efforts in reducing this attitude.

Finally, a new area of research that was not considered in the previous gap analysis is the effectiveness of Brief Intervention and Referral to Treatment. Systematic review evidence suggests that, although these interventions demonstrate promising findings, there is a very limited evaluation literature for gambling, highlighting the need for the further evaluation of these interventions, particularly given they are being used in practice.

5.4. Gambling among vulnerable groups

Vulnerable groups refer to groups of people at increased risk for gambling problems. Based on discussions with NSW ORG, priority vulnerable groups identified for this review were adolescents and young adults and people from Aboriginal and Torres Strait Islands, Cultural and Linguistically Diverse Backgrounds (CALD) and those experiencing family violence or homelessness. Estimates of gambling harm suggest that people aligned with these groups are at increased risk for gambling harm. Therefore, the current theme examines these specific groups gambling behaviour, risk and protective factors, and help-seeking behaviours in gamblers and affected others. These groups appear in other themes in this report, including the convergence of gaming and gambling.

The 2020 gap analysis identified several key research areas relevant to the current chapter. These included:

- youth and young adults, which focused on perceptions, motivations, comorbidities, and gambling experiences and predictors of adult problem gambling. The review indicated frequent gambling engagement by youth and that patterns of problems were set by 20 years of age
- CALD and indigenous, which focused on the association between migration and gambling problems as well as indigenous gambling patterns in Australia
- Other vulnerable groups, which focused on family violence and homelessness. The findings from the 2020 gap analysis indicated a high number of cross-sectional and qualitative studies and limited research on CALD or indigenous

populations in Australia.

Seventy-two articles identified in this current review have examined gambling among vulnerable groups. They focused on youth (k=34), young adults (k=18), culturally and linguistically diverse (CALD) and indigenous (k=14), family violence (k=3) and homelessness (k=2). Basic mapping of included studies and research highlights are provided by subtheme below. For details on all mapped studies, including key findings, see Chapter 7.

5.4.1 Youth

Mapping

Thirty-four studies explored gambling behaviours, risk and protective factors and help-seeking by youth. Studies were one systematic review (focused on gambling attitudes and behaviours in sub-Saharan Africa), six longitudinal studies and cross-sectional surveys (k=27) involving the administration of a survey in schools or through online panels. Studies originated from Europe (k=22) with other studies from Australia (k=3) and the UK (k=4) as well as New Zealand, US, Canada and Africa.

Highlighted Research

Three empirical studies highlighted issues associated with youth gambling.

Youth and New Forms of Gambling

Russell et al.'s (2020) cross-sectional study, examined the experiences of youth in NSW and their response to new forms of gambling. The study was funded by NSW ORG (see related report). It recruited 2004 young adults through an online panel and administered measures on experience and participation in gambling and free-to-play options during adolescence. New forms of gambling examined included video games with gambling content, social casino games, fantasy sports esports and skins gambling. Results indicated that engagement with new forms of gambling was associated with less uptake of traditional gambling such as EGMs, but these new gambling forms were still associated with harm. The authors conclude that new forms of gambling should be monitored for their potential to cause harm, especially amongst youth.

A similar study by Stark, Reynolds and Wiebe (2021) surveyed 2651 young people and parents in Ontario to determine the relationship between gambling problems and gaming. Results indicated that playing video games for money and social casino games was associated with higher problem gambling levels in young people. The authors noted that adult parents also reported a similar pattern of combined problem gambling and gaming.

Youth and Parental Gambling

Forrest and McHale (2021) examined the effect of parental gambling on 1058 children six years of age and adult rates of problem gambling. They reported that children were more likely to develop later gambling problems where a parent had a gambling problem (not just gambling). Interestingly this transmission between generations only applied for fathers' behaviour influencing daughters and mothers' behaviour influencing sons. The authors concluded that public health measures should target those who recently reached the legal age for gambling, especially those with a history of parental gambling problems.

5.4.2 Young adults

Mapping

Eighteen studies explored gambling behaviours, risk and protective factors and help-seeking by young adults. Included studies were one RCT which examined methods to change perceived norms about gambling, 11 cross-sectional, four longitudinal and two qualitative. Studies originated from the UK (k=6), Europe (k=4) and the US (k=4), with one study each from Australia, China, Hong Kong and Nigeria.

Highlighted Research

Four empirical studies were chosen to highlight problem gambling in young adults.

Stability of Gambling in Young Adults

Longitudinal studies from population-representative study designs have examined the experiences of gambling and problem gambling across adolescence and into early adulthood. Emond, Griffiths and Hollén et al. (2020) examined the stability of gambling between 20 and 24 years through analysis of the Avon Longitudinal Study of Parents and Children (ALSPAC) involving 2624 participants. They reported that at age 20 years, gambling problems were relatively stable and varied little between age 20 and 24 years. Those with gambling problems at 20 years of age reported a history of parental problem gambling and the presence of sensation seeking conduct problems in adolescence. These findings were similar to another study by Hollén, Dorner, Griffiths and Emond (2020) who also reported that gambling between 20 and 24 years was relatively stable.

COVID-19 and Young Adults

In another study with the same participants Emond, Nairn, Collard, and Hollén (2021) examined young adult gambling patterns following the outbreak of COVID-19 in the UK. They reported gambling frequency reduced for young people during a lockdown, but there was an increase in online gambling, predicted by past gambling engagement. The authors also found a relationship between alcohol use and regular gambling during lockdown periods.

Gambling and Suicidality in Young Adults

Cross-sectional studies on young people examined a wide range of correlates, including substance use, disorders, personality, emotional dysregulation and mood and other mental health disorders. Wardle and McManus (2021) examined suicidality among 3549 young adults in England and Wales aged between 16 and 24 years. They reported an association between problem gambling and suicidal ideation in both young adult females and males. The authors reported that this relationship remained significant even after accounting for a range of other indicators such as anxiety, life satisfaction and impulsivity. The findings suggest that young people at risk of problem gambling are screened for suicidal ideation.

Young Australian Women and the Gambling Experience

Only one Australian study focused on the experiences of young adults. Thomas et al. (2021) examined the relationship between socio-cultural and industry practices on gambling attitudes and behaviours with 45 young females from Australia. Thematic analysis suggested that crucial influences on gambling engagement were an experience of it being fun, enjoyable, and culturally acceptable. Young women were influenced by peers, partners and families to engage with gambling behaviours and

through marketing and availability of products. The authors concluded that public health campaigns targeting young women would be helpful.

5.4.3 CALD and indigenous

Mapping

Fourteen articles explored CALD (k=11) and indigenous gambling (k=3). Included articles were two systematic reviews, four cross-sectional surveys, two longitudinal and six qualitative. Studies originated from Australia (k=3), Canada (k=3) and the USA (k=3), with single studies each from the UK, Czech Republic, South Korea, Germany and China.

Highlighted Research

Two empirical studies were highlighted, which investigated CALD and indigenous gamblers.

Gambling and Indigenous Australians

Saunders and Doyle (2021) conducted a rapid review to identify gambling interventions and fundamental principles to guide administration with Indigenous communities. The review, which focused only on Canada, Australia, New Zealand, identified 43 articles presenting empirical or theoretical findings. Key themes were (i) ensuring the intervention had an indigenous foundation inclusive of indigenous knowledge, practices and relationships; (ii) community control across the intervention life cycle indicated by involvement in intervention development, delivery and evaluation; (iii) capacity strengthening for the community through education and supporting self-determination; (iv) holistic approach that accounts for inequities and appreciation of broader social, cultural and political influences; (v) ensuring a competent workforce as indicated through upskilling indigenous people and ensure representativeness in responding to gambling harm; (vi) development of a collaborative network across gambling and other health contexts as well as within indigenous communities; (vii) offering regulation support such as transparency in costs and benefits of gambling operations that may impact on indigenous communities. The authors present a model that can inform a culturally-centred public health response and consider the importance of community-control, collaboration, community capacity building, workforce competence, and a holistic approach to addressing gambling harm.

Gambling and CALD Communities

Adam et al. (2020) developed a culturally responsive framework to address gambling harm specific to Australia. Funded by NSW ORG, the framework aims to provide evidence-based approaches that inform culturally responsive public health approaches and are accessible and relevant to service providers. The framework was based on extensive evidence gathering and presents three key dimensions – understanding gambling harm, identifying stressors and vulnerabilities, and implementing strategies to address problem gambling effectively. The authors developed a series of implementation tools to guide practitioners, including an e-learning hub, implementation readiness self-assessment score, lived experience storybooks, various practice case studies and templates and a clearinghouse of information.

5.4.4 Family violence

Mapping

Three studies explored family violence, including two cross-sectional studies and one qualitative study. Two studies were from Australia, with one study from China.

Highlighted Research

Two studies highlighted family violence in Australia.

Dowling, Oldenhof, et al. (2021) examined factors associated with family violence victimisation and perpetration in treatment-seeking gamblers in Australia. A total of 141 participants were recruited from counselling services in Victoria and administered measures on family violence, gambling severity and other mental health. The prevalence of family violence was 25.5%, with similar proportions reporting victimisation (18.4%) and perpetration (19.1%). The authors highlighted a need for routine screening for family violence in problem gambling services and the development of prevention and intervention programs.

Hing and colleagues (Hing et al., 2020) investigated the relationship between gambling and intimate partner violence against women by a male partner. A total of 72 women were recruited from across Australia and interviewed on their lived experience of gambling-related interpersonal violence, plus an additional 39 service providers. The study found that gambling intensified interpersonal violence against women and was associated with financial and emotional stressors and difficulties in the relationship. The study also reported themes around organisational influences on interpersonal violence, including gambling venues practices and limited recognition by services of problem gambling issues or financial harm as a contributor to interpersonal violence. The authors concluded that multi-level public health approaches that prevented and addressed gambling-related interpersonal violence were needed.

5.4.5 Homelessness

Mapping

Two articles explored homelessness, including two systematic reviews with one of the systematic reviews also including qualitative analysis of in-depth stakeholder interviews. One article was from Australia, and one was from Canada.

Highlighted Research

Both studies were highlighted exploring problem gambling within the context of poverty and the experience of homelessness by older people.

A scoping review by Hahmann, Hamilton-Wright, Ziegler, and Matheson (2021) identified 27 studies examining the relationship between poverty and problem gambling. The review reported that gambling problems were associated with homelessness and other poverty measures, including unemployment, housing instability, low income and neighbourhood disadvantage. Across included studies, gambling problems were more significant among homeless populations than those not homeless. Authors concluded gambling problems were a hidden health issue in homeless populations that, combined with the stigma of homelessness, was a barrier to treatment and support.

Vandenberg, O'Brien, Livingstone and Carter (2021) conducted a rapid review of the literature on homelessness and older people, as well as a series of stakeholder in-depth interviews. The rapid review, which examined problem gambling and homelessness, identified 57 quantitative and qualitative articles examining the co-occurrence of gambling and homelessness (k=44) and the prevalence of homelessness among gambling populations (k=14). The review reported that the prevalence rates of homelessness and problem gambling varied substantially in convenience samples (1.4% to 27.1%) and treatment-seeking samples (28.3% and 62.8%). Vandenberg also conducted a series of stakeholder interviews with 48 gambling or homelessness providers who worked with older adults. Thematic analysis indicated a relationship between gambling and homeless in older adults where homelessness preceded gambling problems, and gambling problems preceded homelessness. This relationship was made worse by co-occurring issues such as substance use, mental illness and past trauma. Because gambling and homelessness are highly stigmatised, the authors note that service providers frequently hide and overlook them.

5.4.6 Conclusions and implications

Findings indicate that, since the previous gap analysis, most research within this theme continues to be cross-sectional or qualitative study design and focused on youth or young adult gambling. The review identified fewer studies on CALD and Ingenious people and very few on family violence or homelessness. The findings are broadly consistent with the previous gap analysis, which indicated more emphasis on youth and young adult populations than other vulnerable groups.

The current and previous reviews highlighted the utility of utilising data obtained in large scale longitudinal studies to understand the transmission of gambling from youth to young adults and predictors of later problems. The current review included multiple studies suggesting that the nature of youth and young adult gambling may change whereby there is a shift away from traditional forms of gambling and towards new and emerging gambling types. The included studies suggested that harm may be lesser than forms such as EGMs but that young people did experience harm from these new types of games. The evidence presented for CALD and indigenous included two potentially valuable frameworks for understanding and responding to problem gambling in these populations.

Future work should investigate the application of these frameworks and the impact on problem gambling. Other gaps identified included family violence and homelessness, with very few studies. Included studies suggested opportunities to screen these populations for gambling problems and a need for early intervention and treatment resources.

5.5. Emerging technologies and new trends

Emerging technologies and new trends refers to gambling-related issues that are enabled by technology. Due to the ever evolving and fast-growing advancements in technology, it is important to understand how these advancements impact on the gambling field. The current theme therefore examined emerging technological gambling features and activities, and emerging technologies and trends in payment methods for gambling-related activities. Due to the availability of online gambling for many years (Rodda, 2020) this theme did not include online gambling, instead

focusing on emerging trends in the comorbid relationship between gambling and gaming disorders.

The 2020 gap analysis identified several key research areas exploring emerging technologies and trends, including:

- new forms of gambling types and features, including engagement in fantasy sports betting, the association between gambling problems and in-play sports betting, and the profile of in-play bettors who engage in microtransactions
- the convergence of gaming and gambling, including the associations between problem gambling and gaming, and the associations between gambling problems and loot box consumption and skins betting
- other developments, including the associations between gambling problems and esports betting and cryptocurrency trading, and the use of data science, such as machine learning, in gambling research.
- The findings from the 2020 gap analysis, extended from the previous rapid review conducted in 2018, in which video gaming and gambling, the expansion of the sports betting market, changes in EGM characteristics, and new technologies and trends in advertising and inducements were identified as emerging technologies and trends (Lawn, Oster, Riley, Baigent, & Smith, 2018).

Forty-six articles in this current review examined issues relating to emerging technologies and new trends focussed on emerging technological gambling features and activities (k=31), the relationship between gambling and gaming (k=12), and emerging technologies and trends in payment methods (k=5). Basic mapping of included studies and research highlights related to one of the subthemes are provided below. For details on all mapped studies, including key findings, see Chapter 7.

5.5.1 Emerging technological gambling features and activities

Mapping

Thirty-one articles explored emerging technological gambling features and activities. Of these articles, six were systematic reviews, with the remaining using cross-sectional study designs (k=23), longitudinal study designs (k=1) and secondary data analysis of existing open access databases (k=1). Of these articles, five were conducted in Australia, followed by the USA (k=4), international samples (k=4), Germany (k=3), UK (k=3) and Japan (k=2). Twelve of these articles used adolescent only (< 18 years) or adolescent and young adult samples (≤ 25 years of age).

Highlighted Research

There were six notable studies chosen for highlighting under this subtheme.

Loot Box Engagement and Gambling Problems

Two meta-analyses identified a small-to-medium positive association (r = 0.26-0.27) between loot box spending/purchasing and problem gambling (Garea, Drummond, Sauer, Hall, & Williams, 2021; Spicer et al., 2021).

In a young adult Australian sample (18-24 years), Rockloff et al. (2021) - see related NSW report - found that playing loot box games, opening loot boxes and buying loot

boxes were cross-sectionally associated with greater gambling-related problems and harms in women, whereas, buying and selling loot boxes was associated with greater gambling-related problems and harms in young adult men. Playing games with loot boxes was not associated with gambling problems in the Australian adolescent sample (12-17 years; n=481), but opening, buying and selling loot boxes was associated with greater gambling problems in adolescent girls, and buying loot boxes was associated with greater gambling problems in adolescent boys. Longer experience with loot boxes was not associated with gambling problems or harms in young adults, however, longer experience with opening loot boxes was associated with fewer gambling-related problems for adolescent girls.

Gambling and other emerging technological gambling features and activities

A rapid review by Shi, Colder Carras, Potenza and Turner (2021) found that individuals who play gambling-like games (e.g., social casino games, free-to-play websites) are more likely to view gambling as safe and healthy entertainment, despite several studies revealing that free-to-play gambling-related games are associated with gambling for money and gambling problems in youth, and microtransactions have been associated with subsequent gambling.

In a sample of Australian adult esports bettors/skins gamblers, Greer and colleagues (Greer, Rockloff, Russell, & Lole, 2021) revealed that 41.5% had participated in esports cash betting, esports skin betting and skin gambling on games of chance, with participants most often gambling on esports with money, followed by esports with skins and skins gambling on chance. When compared to traditional sports bettors, esports bettors/skin gamblers were at greater risk for problem gambling and gambling-related harms, and being an esports bettor/skins gambler was the strongest predictor of experiencing gambling problems and gambling-related harms, beyond all other traditional gambling activities.

In a UK adult population representative sample, Zendle (2020) revealed that 18.5% of the population had participated in any form of gambling-like video game practice in the past 12 months, with loot box spending, social casino spending, esports betting, token wagering and real-money video gaming being the most popular of these practices. Problem gambling was most strongly positively correlated with any form of gambling-like video game practice, followed by esports betting, social casino spending, real-money video gaming, loot box spending and token wagering.

5.5.2 The relationship between gambling and gaming

Mapping

Twelve articles explored the relationship between problematic gambling and gaming. One of these articles was a systematic review, with the remaining articles using cross-sectional (k=10) and longitudinal (k=1) study designs. Three articles were conducted in Canada and Spain, followed by two articles in the USA and Sweden. Five articles used young adult samples (< 30 years of age). No notable studies were chosen for highlighting but key findings for all studies can be found in Chapter 7.

5.5.3 Emerging technologies and trends in payment methods

Mapping

Five articles explored emerging technologies and trends in payment methods. Three of these articles utilised a longitudinal study design and two conducted secondary data analyses of existing databases. Most of these articles (k=3) used international samples, with one study conducted in Australia and Kenya. No studies chosen for highlighting but key findings for all studies can be found in Chapter 7.

5.5.4 Conclusions and implications

Since the previous gap analysis, findings showed that most of the research explored emerging technological gambling features and activities and the relationship between gambling and gaming disorders, with very limited research exploring technologies and trends in payment methods. This is consistent with the previous gap analysis, in which most of the literature explored new forms of gambling types/features (i.e., fantasy sports betting, microtransactions) and the convergence of gaming and gambling (i.e., the relationship between gaming and gambling, and the association between loot boxes and skins gambling with problem gambling), with fewer studies exploring currency and payment-related technologies and trends. These findings suggest the need for research exploring the impact of emerging technologies and trends in payment methods on gambling behaviour, which is particularly pertinent given the transition to cashless payments due to the COVID-19 pandemic (Huterska, Piotrowska, & Szalacha-Jarmużek, 2021).

Since the previous gap analysis, most of the research has explored the association between loot box engagement and gambling problems. This systematic review and cross-sectional evidence has consistently revealed that individuals who engage with loot boxes experience greater gambling problems. This evidence base has, however, been limited by the cross-sectional nature of much of the research, which focuses on bivariate associations without taking into account other potential explanatory factors, and in which causality cannot be inferred. These findings highlight the need for further research that improves on the methodological quality of the available research (e.g., longitudinal studies that account for other potential explanatory factors). Notwithstanding these limitations, the findings highlight the need for prevention interventions that target this association and educate individuals in the convergence between loot box engagement and gambling. This also highlights the need for research into other emerging technological gambling features and activities, particularly newer forms that seem to have emerged. For example booster packs in collectible card games that have been compared to loot boxes (Zendle, Walasek, Cairns, Meyer, & Drummond, 2021), and cryptocurrency trading (Sonkurt & Altinoz, 2021).

5.6. Gambling industry products, practices, environments and regulation

This theme examines topics relevant to the regulation of gambling products, practices and environments including geographic and time-based accessibility to gambling; product characteristics and bet types; consumer protection, responsible gambling tools and strategies; staff training and host responsibility; marketing of gambling and self-exclusion programs. It is important that these are examined to ensure policy makers have the latest research evidence to inform decision making.

Findings from the 2020 Gap Analysis were drawn from multiple sections to align to topics examined in this review. They showed:

- consistent evidence of a positive relationship between gambling marketing and gambling intentions and behaviour
- generally positive attitudes towards consumer protection and responsible gambling measures
- venue shutdowns impact only those with gambling problems
- host responsibility and staff training programs increase staff ability to engage with at-risk gambling patrons but role conflict and confusion mean staff are unlikely to proactively intervene
- tailored feedback/messaging can encourage limit setting but gamblers often do not notice or recall messages
- mixed evidence regarding the effectiveness of responsible gambling tools to change behaviour
- use and effectiveness of self-exclusion programs are limited by a lack of awareness, complex processes, a lack of coverage and support by venues and an inability to prevent breaches
- interventions are dominated by individual-level harm reduction rather than supply reduction, with effectiveness limited by the extent to which users use tools within voluntary systems.

In this current review, sixty-two articles/reports examined this theme, relating to marketing of gambling (k=13), product characteristics and bet types (k=12), staff training and host responsibility (k=5), consumer protection, responsible gambling tools and strategies (k=16), geographic and time-based accessibility to gambling (k=11), and self-exclusion programs (k=9). Basic mapping of included studies and research highlights related to five of the subthemes are provided below. For details on all mapped studies, including key findings, see Chapter 7.

5.6.1 Marketing of gambling products

Mapping

Thirteen studies examined marketing of gambling products. There was one systematic review, five cross-sectional studies plus other study designs including longitudinal, RCTs, qualitative, mixed methods and secondary analysis. One study was conducted in Australia, the remaining studies were conducted in Europe including in Spain, Norway, Denmark and the UK.

Highlighted Research

Digital gambling marketing

A systematic review by Guillou-Landreat and colleagues (Guillou-Landreat, Gallopel-Morvan, Lever, Le Goff, & Le Reste, 2021) was highlighted. It extends earlier research by examining research in relation to digital marketing strategies conducted over the past 20 years (2000-2020). The review identified 21 studies and three themes: (1) sport is clear target with digital marketing increasing exposure to gambling, building loyalty, fostering normalisation of gambling on sport and influencing behaviour; (2) strategies are gendered, targeting young men primarily; (3) marketing targets vulnerable populations such as young people and those experiencing problems. These findings cohere with prior and recent research that similarly demonstrate consistent positive relationships between marketing and

gambling awareness, behaviour, hams and problems (see Table of Included Studies for the wider body of recent research in relationship to gambling marketing).

5.6.2 Product characteristics and bet types

Mapping

Twelve articles/reports examined product characteristics and bet types. There was one scoping review, six cross-sectional studies, as well as RCTs and experimental designs. One study was conducted in Australia, with other studies conducted in Canada (k=5), USA (k=3), Spain (k=1) and Nigeria (k=2).

Highlighted Research

A scoping review by McAuliffe and colleagues (McAuliffe, Edson, Louderback, LaRaja, & LaPlante, 2021)[7] covering 2001-2020 was highlighted identifying two areas relevant to this theme - (a) EGM note acceptors and (b) EGM structural characteristics. One study found gambling frequency and problems decreased following the removal of note acceptors from EGMs. Five studies examining EGM structural characteristics demonstrated that limiting maximum bets to $1 reduced number of bets and gambling losses, but no significant effect was found from modifying note acceptors or reel speeds.

5.6.3 Staff training programs and host responsibility

Mapping

Five studies examined this subtheme including one systematic review and four studies using secondary analysis. Three studies were conducted in Europe, in Portugal, France and UK, one in Canada and one in the USA.

Highlighted Research

A systematic review (Škařupová, Vlach, & Mravčík, 2020) examining studies of staff training programs published between 2000-2015 was highlighted. It found little evidence of effect for land-based programs with staff reluctant to approach without clear signals from patrons due to a perceived lack of evidence of harm, or a lack of skill or confidence. Škařupová, et al found that online surveillance systems used a range of data and complex estimation methods to identify at-risk gamblers. No details were provided regarding patron approach or outcomes.

5.6.4 Consumer protection and responsible gambling tools/ strategies

Mapping

Sixteen studies examined this subtheme including one scoping review, one systematic review, one meta-analysis, one secondary analysis, two qualitative studies, two mixed methods, five RCTs, two cross-sectional designs, and one longitudinal study. Studies were conducted in Australia (k=2), the US (k=3), South Korea (k=1) and Europe including Sweden (k=2), Norway (k=2), France, Czech Republic (k=1) and the UK (4).

Highlighted Research

[7] McAuliffe's scoping review mapped evaluations of a range of tools and interventions intended to mitigate risks of gambling harm. The wide-ranging nature of the review means that findings will be discussed within multiple subthemes.

Evidentiary Reviews

The scoping review by McAuliffe et al. (2021) was again highlighted. It encompassed research from 2001-2020 finding mixed results for consumer protection and responsible gambling tools/ strategies. Overall, the results suggested that most responsible gambling tools have some promise for supporting gamblers with most studies in each area demonstrating either positive outcomes or mixed results. However, in each case a significant minority of studies (17% of pop-up message studies; 25% of information aid studies, 25% of precommitment studies and 43% of break-in-play studies) found no or unfavourable outcomes suggesting the need for more evaluation or outcome studies to better understand when, how and for whom these tools work.

A systematic review by Škařupová et al. (2020) covering studies published from 2000-2015 found dynamic messaging was better remembered and considered more useful than static messaging and that targeted messaging had more evidence of effect. They found limit setting in a voluntary system was useful for people experiencing problems but that precommitment systems needed to be compulsory, irreversible and apply widely across all gambling opportunities to be effective. Finally, a systematic review and meta-analysis of pop-up messages (Bjørseth et al., 2021) found a moderate effect of messages on gambling cognitions (g=0.413) and behaviours (g=.507).

The Importance of Intervention Design

Four other studies were selected for highlight with findings emphasising the importance of intervention design.

An Australian RCT with 213 participants (Byrne & Russell, 2020) tested the effects of providing EGM gamblers with real-time play data via EGM interface and using pop-up messages to encourage gamblers to estimate spending (vs standard interface). Compared to controls, participants with an informative interface were more accurate at estimating time and money spent, and those receiving pop-up messages were more accurate about money spent. Those who quit rather than spend winnings after a cue were also more likely to have an informative interface (85.2%) compared to standard (14.8%), but there was no significant difference in total spending or dissociation between groups.

A UK study by the Behavioural Insights Team (2021a) used an RCT to examine the effect of design on deposit limits with 1731 online gambling wagerers who had not previously set a deposit limit. Participants were allocated to a 'business as usual' condition with deposit limits listed up to £100,000; or one of two experimental conditions: (a) deposit limits listed to £250 + free text box for higher limits, or (b) no numerical anchors + maximum limit of £100,000. Results showed the importance of carefully designed deposit options with people in the two experimental conditions setting significantly lower limits compared to the control condition. There was no evidence to support the effectiveness of setting lower limits on spending, however, with no between group differences in amounts deposited to accounts over 30 days.

Heirene and Gainsbury (2021) used an RCT to test the relative effectiveness of different types and delivery modes of messages to increase deposit limit setting in a sample of 26,560 current online wagerers who had previously opted out of limit setting. Messages were (1) informative (2) personal or (3) provided social comparators and were sent via email or account notification by gambling operators.

Findings showed gamblers sent messages were more likely to set deposit limits (0.71%) within five days of receiving the message than the control group (0.08%). Message type and delivery mode did not differentiate uptake suggesting that the presence of messages may be more important than their content.

Jacob, Larkin and Lawrence (2021) reported on effectiveness and impact evaluations conducted on messaging strategies implemented by gambling operators as part of an overall program of safer gambling messaging. A mix of RCT's and pre-post evaluations were used. Direct messaging interventions (e.g., emails, SMS) were generally ineffective in increasing the proportion of customers using consumer protection tools. A revised sign-up process to reduce friction and increase salience significantly increased the proportion of new customers choosing to set deposit limits compared to a control group (10.3% vs 1.0%), however, an evaluation of pop-up reminders sent to current online wagerers did not significantly improve uptake of deposit limits compared to a control group who did not receive a reminder. Pre/post evaluations also found a substantial increase in gamblers enabling consumer protection tools following reminders or social media advertising campaigns. Again, however, results showed that none of the interventions impacted subsequent gambling behaviour.

5.6.5 Geographic and time-based accessibility to gambling

Mapping

Eleven articles and reports examined geographic and/or time-based accessibility to gambling. There was one scoping review, six cross-sectional designs and a range of other designs including longitudinal, qualitative and secondary analysis. Studies originated in Australia (k=4), New Zealand (k=1), US (k=1), Canada (k=1), and from across Europe including one each from Italy, Switzerland, Norway and Italy.

Highlighted Research

The scoping review by McAuliffe et al. (2021) identified two studies over 2001-2020 showing that restriction of EGM (machine) supply increased rather than decreased revenue, with only a minority of people gambling less following restrictions. Four additional studies were highlighted providing insight into accessibility to EGM venues in the Australian context.

The Effect of Proximity to EGM Venues

Two studies examined proximity effects using publicly available data analysed at the local area level with both studies suggesting venue accessibility is important. Badji, Black, and Johnston (2020a) – see related report - found a one-venue decrease (closure) was associated with 1.8 fewer personal insolvencies per year in a local government area and that this effect intensified in areas with more clustered spatial distributions of venues. In a later report, Badji, Black, and Johnston (2020b) examined EGM venue proximity using a national dataset, finding a small effect such that people living within 250m of a venue were 6% more likely to gamble and 5% more likely to experience financial hardship than those living >2km from a venue.

The effect of COVID-19 related restrictions to land-based gambling

Five studies examined the effects of COVID-19 related restrictions to land-based gambling globally. The two Australian studies that examined effects of state-based venue shutdowns are highlighted.

Gainsbury, Swanton, Burgess and Blaszczynski (2021) surveyed 764 gamblers (85% regular gamblers) finding that while the majority continued to gamble online during shut-downs, significant decreases in gambling frequency were reported overall and in online gambling. Problem gambling severity was not related to increases in gambling. There was no evidence of widescale transference to online gambling with logistic regressions showing decreases in overall gambling by regular EGM and sports gamblers.

Black, Swanton, Burgess, and Gainsbury (2021) conducted a longitudinal study of 462 Australian adults over 2020[8]. Comparisons between states experiencing and not experiencing restrictions found no significant differences in online gambling participation. Examination of change over time showed a small reduction in gambling post restrictions (compared to prior), but no change in gambling problems. Those at moderate-to-high risk of gambling problems at baseline showed no significant reductions in gambling engagement or problems over time.

A limitation of both Australian studies was that the majority of the sample were regular online gamblers but only around half were regular in-venue gamblers, so results are not representative of a population who regularly gamble in land-based venues.

5.6.6 Self-exclusion

Mapping

Nine studies examined self-exclusion including a variety of study designs including systematic review, RCT, qualitative, longitudinal, cross-sectional, and mixed methods. Studies originated in Australia (k=2), Canada (k=2), the UK (k=3), Germany and the Czech Republic (k=1).

Highlighted Research

Structural Barriers to Self-Exclusion

A systematic review by Škařupová et al. (2020) identified 10 studies published between 2000 and 2015. They found evidence of positive effects of programs but that most gamblers breached self-exclusion and structural obstacles including complicated procedures, single venue exclusion, stigma and a lack of support of schemes limited their success. They also found that combining self-exclusion with other interventions did not increase effectiveness, but that new technology supporting multi-operator self-exclusion may overcome issues associated with single venue exclusion.

Pickering and Blaszczynski (2021) examined consumers perspectives regarding the end of self-exclusion agreements. Participants found processes straight-forward, but most did not feel adequately informed about re-enrolment and exit processes. This was particularly the case for those who chose to discontinue self-exclusion. Recommended improvements included quick and easy re-enrolment, permanent exclusion options, and a structured ‘safety plan’ for returning to venues (e.g., time

[8] Note Wave 1 data for Black et al., (2021) is a subset of dataset used by Gainsbury et al., (2021) but with different foci and analyses.

and money limits). No significant differences were observed between those who renewed and those who discontinued self-exclusion.

Pickering, Blaszczynski, Serafimovska, and Gainsbury (2021)[9] conducted a multi-stage, mixed-methods study to develop and evaluate an online portal to self-exclusion, 'MySelfExclusion'. The portal aimed to overcome some of the known barriers to uptake of self-exclusion by streamlining processes and facilitating autonomous self-exclusion from multiple land-based venues. The study, funded by NSW ORG, used a co-designed, iterative process to (a) identify key design and functional requirements for a self-exclusion website, (b) evaluate ease of use to complete self-exclusion registration, and (c) evaluate approval of and intention to use such a system. Key website attributes identified included simplicity in design; a credible and trustworthy environment; and an ability to accommodate individual user needs. Evaluations found potential users were generally positive towards the pilot website, rating it as convenient and generally easy to use, and indicating a strong likelihood of using such a site if it was open to the public. Suggestions for improvements included the need to ensure adequate data security and further streamlining of the multi-venue exclusion process.

Supporting Self-Exclusion

Yakovenko and Hodgins (2021) evaluated the relative effectiveness of an online vs face-to-face intervention to support self-exclusion. Interventions were not identical but both included resources and tools to support recovery. The 201 participants were randomly assigned to the two programs when registering for self-exclusion and followed up over 12 months. Participants in both groups experienced reductions in problem severity and days and money spent gambling plus less need for formal treatment over time. There were no significant group differences on outcomes suggesting either may be a useful option.

5.6.7 Conclusions and implications

Consistent with the 2020 gap analysis there was an emphasis on research examining individual-level support mechanisms to provide gamblers with better information and/or to nudge behaviour change, with findings demonstrating the value of good design to increase uptake and use of responsible gambling tools. Studies suggested that dynamic and targeted messaging can be effective and that the content may not be as important as simply receiving messages. However, consistent with the last gap analysis, evidence was mixed as to whether use of such tools results in positive behaviour change suggesting the need for more outcomes-based studies.

Studies related to supply of gambling were relatively rare but provided new evidence to suggest that restricting access to EGM venues can lead to reduced gambling and related harms and COVID-19 related studies found little evidence that such restrictions lead to widespread transference to online gambling. The systematic review of digital gambling marketing supported prior and recent evidence, revealing a positive relationship between marketing and gambling awareness, behaviour,

[9] Pickering et al.'s (2021) study of an online self-exclusion portal was requested for inclusion by NSW ORG due to its topical nature but it should be noted that whilst it was published within the search timeframe it was not identified within the systematic search parameters.

harms and problems. A remaining gap are outcome studies testing effectiveness of restrictions on marketing.

Host responsibility studies focussed on use of patron data to create risk profiles that detect gambling problems in patrons. These show potential, however, there was no discussion of when and how these profiles would be used to approach gamblers. Similarly, a systematic review again found land-based programs are significantly hampered by the reluctance of staff to intervene without clear guidelines. The outcome of identification and approach initiatives on gamblers remains unclear and dependent on appropriate staff response, highlighting the need for research that implements improved staff training programs and evaluates their effects on both staff and patrons.

Finally, a systematic review and recent research demonstrated that participation in self-exclusion can reduce gambling behaviour and problems but that the effectiveness of these programs is restricted by structural obstacles and the ability of gamblers to easily circumvent self-exclusion to continue gambling. New technology facilitating multi-venue exclusions may increase uptake and effectiveness of self-exclusion programs and further research should evaluate these as they roll out and continue to examine the efficacy and effectiveness of programs to support self-exclusion.

6. Conclusions and implications

Consistent with the previous gap analysis, research relating to **measuring and understanding gambling prevalence and harm** focused on identifying prevalence estimates, with multiple state and territory prevalence surveys conducted across the past 15 years highlighting variable rates of gambling participation and low-risk gambling, but relatively steady rates of problem and moderate-risk gambling. Two national studies conducted nearly a decade apart, however, highlighted a doubling of problem gambling in the context of declining participation and stable moderate- and low-risk gambling. Further research is required to investigate the trends in gambling participation and problems over time to clarify these two disparate sets of findings. Although fewer in number, the current review identified a group of studies that continued the academic debate in relation to the measurement of harm, albeit with mixed findings, highlighting the need for further research in this area. Another remaining research gap is the need for longitudinal studies that explore transitions across the continuum of risk and harm over time, as well as the temporal relationship between individual, peer/family, and societal factors that may be associated with gambling problems and harms.

Findings in relation to **community level prevention and early intervention** indicate that most research since the previous gap analysis has focused on early intervention, with very few studies on prevention or self-management. Consistent with the previous review, no published prevention studies originated in Australia, highlighting a continued, significant knowledge gap. The evidence presented for early intervention consisted primarily of systematic reviews that indicated further opportunities for intervention development. Gaps were identified regarding internet delivery of early intervention, which could increase reach, ease of dissemination and access for many. Other gaps were related to screening and brief intervention and self-management of gambling harm by gamblers and affected others.

Research in terms of the **effectiveness and efficacy of treatments** has focused on the efficacy of treatments for gamblers, consistent with the previous gap analysis. The main findings revealed support for CBT and MI and promise for Internet-delivered and brief interventions, but that dropout from these interventions is high. Taken together, these findings highlight CBT and MI training requirements, as well as a need to evaluate alternative psychological treatments and the active components of treatment. Moreover, only a small proportion of gamblers and affected others seek treatment, highlighting a need for public health efforts to reinforce common motivators and redress common barriers to help-seeking. Remaining research gaps include the evaluation of treatments for affected others, given they comprise a considerable proportion of help-seekers, as well as further evaluation of Brief Intervention and Referral to Treatment, particularly because it is being used in practice.

Findings in relation to **vulnerable groups** indicate that, since the previous gap analysis, most research within this theme continues to be cross-sectional or qualitative study design and focused on youth or young adult gambling. The review identified fewer studies on CALD and Ingenious people and very few on family violence or homelessness. Overall, these findings suggest the need for a move away from qualitative and cross-sectional surveys and towards other designs such as

longitudinal studies and interventions, including evaluation of prevention, early intervention and treatment.

Consistent with the previous gap analysis, research into **emerging technologies and new trends** focused on emerging technological gambling features and activities, followed by the relationship between gambling and gaming. The main findings included the consistent positive association between loot box engagement and gambling problems, and the lack of research exploring emerging technologies and trends in payment methods. Remaining research gaps in this area include the need for longitudinal studies that explore the associations between emerging technological gambling features and activities and gambling problems while taking into account other potential explanatory factors, as well as research into the impact of emerging technologies and trends in payment methods on gambling behaviour.

Research into regulation of **gambling products, practices and environments** was consistent with the 2020 gap analysis in its emphasis on individual-level support mechanisms rather than control of supply and in relation to findings regarding gambling marketing, host responsibility/staff training and self-exclusion. Findings emphasised the value of good design to increase uptake and use of responsible gambling tools, the benefits of reduced access to land-based gambling and the potential of patron data to identify at-risk gamblers. Remaining research gaps in this area include the need for more outcomes-based studies to test the effectiveness of responsible gambling tools on behaviour and the effectiveness of evidence-based restrictions on gambling marketing. Finally, research examining programs to support gamblers experiencing problems – self-exclusion and identification of problematic gambling - suggest a need for extensive review as well as outcome evaluations to ensure success.

Taken together, these results suggest that the body of research is consolidating in some areas but that gaps remain. Remaining research gaps identified in this review include the need for more research examining specific topics or issues such as:

- The measurement of gambling harm and problems
- Temporal relationships between individual, peer/family, and societal factors that may be associated with gambling problems and harms
- The impact of emerging technologies and trends in payment methods on gambling behaviour, and
- Gambling in vulnerable groups (CALD; Indigenous peoples, those experiencing homelessness and in relation to family violence).

Findings from this review indicate a clear need for more longitudinal and prospective research, more outcome studies and more implementation and evaluation research to test evidence-informed interventions and allow evidence to inform translation of research into practice and policy. The review identified numerous COVID-19 related studies, suggesting the need to consider monitoring for impacts of COVID-19.

Findings from this review, read in conjunction with the prior 2020 gap analysis, has important implications for policy and programs including that:

- Internet delivery of early intervention has the potential to increase reach and access
- High rates of treatment dropout may restrict positive outcomes
- Staff training to identify signs of gambling problems requires clear industry and governmental guidance on approach protocols

- Structural obstacles to self-exclusion programs must be removed and new technology deployed to prevent breaches and support multi-venue sign-up
- Reduced access to EGM venues may support reduced engagement and harm with little evidence this results in widespread transference to online gambling
- Public health efforts may address barriers to help-seeking
- Prevention interventions are needed to target the association between loot box engagement and gambling problems
- At-risk individuals need to be educated in the convergence between loot box engagement and gambling.

7. Tables of included studies

Tables of included studies are presented below in alphabetical order by theme. Where articles/reports reported on multiple independent studies within the one document, key findings are provided on separate lines.

Table of Included Studies Theme 1: Gambling prevalence and harm

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
Afe, Ogunsemi, Daniel, Ale, and Adeleye (2021)	India	Clinical and General population	Other (patients at a general outpatient unit)	Clinical: 53 General popln 400	Clinical: Range: 18-50; M: 26.05; SD: 6.89 General popln: Range 18-150; M: 25.09; SD 5.09	Clinical: 100% General popln: 85%	Cross-sectional	3	To evaluate psychometric properties of the Diagnostic and Statistical Manual (DSM)-5 for use as a self-report screening instrument for large-scale studies in Nigeria
	Main findings: (1) The diagnostic accuracy of DSM-5 and ICD-11, and SOGS were comparably similar; For the DSM-5, the area under the curve (AUC) was 0.99; Sensitivity was 91.4%, specificity was 94.9%, precision rate was 91.4%, false positive rate was 8.6%, true negative rate was 5.1%, and hit rate was 93.6%; The positive predictive value was 91.4%, while the negative predictive value was 5.1%; (2) For the DSM-5, the test-retest reliability was 0.90 and the internal consistency was 0.90-0.92; (3) The majority of the factor loadings of the DSM-5 were highly loaded on a single factor, except Item 8; (4) Convergent and discriminant validity of the DSM-5 were satisfactory.								
Anselmi et al. (2021)	Italy	General population (representative)	Adolescents	4404	Range: 14-17; M: NR; SD: NR	70%	Cross-sectional	3	To employ item response theory on the South Oaks Gambling Screen-Revised Adolescent (SOGS-RA) to compute the difficulty and discrimination of each item
	Main findings: (1) A one-factor model adequately represented the structure of the SOGS-RA and all items contributed to measuring gambling severity; (2) Item 4 (gambling more than planned) was enacted by adolescents with different levels of problem gambling severity, while item 12 (borrowing or stolen money) was enacted only by those with the most severe levels of problem gambling severity; (3) All item discrimination parameters were positive, suggesting that, for each item, the probability of endorsing the item increased with the level of problem gambling severity of the respondents; (4) Receiver operating characteristic curve analysis was used to identify the cutoff that best distinguished daily and non-daily gamblers; and this cutoff outperformed the common cutoff defined on the sum scores in identifying daily gamblers but fell behind it in identifying non-daily gamblers.								
Arcan (2020)	Turkey	General population (convenience)	General population	182	Range: 19-47; M: 24.06; SD: 3.34	54%	Cross-sectional	3	To examine the psychometric properties of the Turkish version of the Problem Gambling Severity Index (PGSI-T)
	Main findings: (1) The PGSI-T demonstrated a uni-factorial structure, with all factor loadings indicating good convergent validity; (2) Internal reliability was good (α=0.82); (3) The PGSI-T displayed good concurrent validity with a range of well-established problem gambling correlates and criterion-related validity, whereby probable pathological gamblers had higher scores than non-problem gamblers.								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
Binde and Romild (2020)	Sweden	General population (representative)	General population	2937	Range: 18-67; M: 43; SD: NR	46%	Cross-sectional	1	To identify which occupational groups have elevated levels of regular gambling participation and at-risk and problem gambling, and to explore job-specific factors associated with elevated levels
	Main findings: (1) Regular gambling (i.e., participating at least monthly in any form of gambling) was reported by 29% of the sample; (2) Using the Problem Gambling Severity Index, 4.2% were classified in the low-risk gambling category, 1.4% were classified in the moderate-risk gambling category, and 0.3% were classified in the problem gambling category, with a total of 6% of the sample classified in the at-risk and problem gambling category.								
Boyle, Browne, Rockloff, and Flenady (2021)	Australia & New Zealand	General population (representative)	Gamblers	5551	NR	54%	Cross-sectional	3	To examine the psychometric performance of three less severe suspect items in the 10-item Short Gambling Harm Screen (SGHS) (reduction of available spending money, reduction of savings, and less spending on recreational expenses), and develop a new scale named Unimpeachable Gambling Harms Scale (UGHS)
	Main findings: (1) Both the SGHS (ω = 0.85) and the UGHS (ω = 0.85) possessed identical and high internal coherence; (2) All three suspect items, both individually and upon aggregation, predicted greater endorsement of "unimpeachable" harms, and indicated the presence of gambling problems; Moreover, the SGHS as a whole is highly correlated with "unimpeachable" gambling harms; (3) The SGHS performed strongly as a predictor of harms across a range of measures and reliably detected at-risk or problem gambling (Sensitivity=88%; Specificity=84%); (4) Including suspect items in the SGHS was found to improve predictions of low- and moderate-risk gambling status, but slightly decreased predictions of problem gambling.								
Browne, Volberg, Rockloff, and Salonen (2020)	Finland	General population (representative)	Gamblers	3795	NR	57%	Cross-sectional	1	To test whether the prevention paradox applies to gambling in Finland.
	Main findings: (1) In a sample of regular gamblers (i.e., those who gambled at least once per month), the problem and pathological gambling rate was 2.3% using the Problem and Pathological Gambling Measure and 3.2% using the South Oaks Gambling Screen; (2) Overall, 14.5% of past-year gamblers reported a gambling harm on the Full Gambling Harms Checklist; (3) The majority of harms were reported by those in the less severe Problem and Pathological Gambling Measure (PPGM) (i.e., scoring <5); however, considering each domain separately, this was true only for financial, emotional/psychological, and work/study harms.								
Butler, Quigg, Bates, Sayle, and Ewart (2020)	British	General population (representative)	General population	2303	NR	38%	Cross-sectional	1	To explore the association between gambling problem severity and health risk behaviours, health and wellbeing
	Main findings: (1) Three-quarters (74.5%) reported gambling at least once in the past 12 months; (2) Using the Problem Gambling Severity Index, the prevalence of non-problem gambling was 93.2%, the prevalence of low-risk gambling was 5.0%, and the severity of moderate-risk/problem gambling was 1.8%.								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
Çakıcı, Çakıcı, Babayiğit, and Karaaziz (2021)	North Cyprus	General population (representative)	General population	799	Range: 18-65; M: NR; SD: NR	NR	Cross-sectional	1	To investigate the prevalence and risk factors of problem and pathological gambling, and to examine the relationship between acculturation and PPG behaviors among NC adult population
	Main findings: (1) Nearly three-quarters (70.6%) participated in one or more of 17 types of gambling activities in their lifetime, with the most played games being horse/dog racing and football betting games, national lottery and casino games; (2) Using the Turkish version of the Revised South Oaks Gambling Screen (SOGS), "possible pathological gambling" (scores ≥ 8) was reported by 2.2% in 2007, 3.5% in 2012, 3.8% in 2014; and 4.5% in the present study; (3) Moreover, estimates of problem gambling (scores of 3-7) were reported by 9.2% in 2007, 9.7% in 2012, 9.5% in 2014, and 9.3% in the present study.								
S.R. Currie, Hodgins, Williams, and Fiest (2021)	Canada	General population (representative)	General population	Sample 1: 3432 Sample 2: 780	S1: Range: NR; M: 45.9; SD: 14 S2: Range: NR; M: 40; SD: 16.9	S1: 46% S2: 43%	Longitudinal	2	To assess the risk of gambling problems over a five-year period in adults who exceed previously derived low-risk gambling limits compared to those who remain within the limits after controlling for other modifiable risk factors
	Main findings: (1) At time 1, the mean monthly net win/loss was 1280-1453, the median monthly net win/loss was 35-45, and the proportion who played EGMs or casino games was 34-39%; (2) 43-63% of participants were below all low-risk gambling limits at time 1 compared to 63% of the LLLP sample; Exceeding 1, 2, and 3 low-risk limits was observed in 14-23%, 16-19%, and 6-14% of gamblers, respectively; (3) In both samples, exceeding the low-risk gambling limits at time 1 significantly increased the risk of moderate harm (defined as ≥2 consequences on the PGSI) within 5 years after controlling for other modifiable risk factors. Other significant predictors of harm were presence of a mental disorder at time 1, cognitive distortions about gambling, stressful life events, and playing EGMs or casino games; (4) In one sample, the five-year cumulative survival rate for moderate harm among individuals who stayed below all the low-risk limits was 95% compared to 83% among gamblers who exceeded all limits; Each additional low-risk limit exceeded increased the cumulative probability of harm by 30%; (5) Similar results were found in models when the outcome was problem gambling.								
Delfabbro et al. (2020)	NA	NA	NA	NA	NA	NA	Systematic Review	1	Explore whether problem gamblers are relatively more likely to gamble on EGMs than other activities; the prevalence of problem gambling in different activities; whether EGMs appear to encourage more frequent play than others; and if there is multivariate evidence to support the dominance of EGMs as a predictor of problem gambling.
	# of included articles: k=12; Study design: Major prevalence studies in Australia; Participant type: General population (representative); Years covered: 2011-2019. Main findings: (1) This study revealed a weighted mean participation estimate of 21.2% for EGMs (range 14.1%-30.0%), 17.0% for racing (range 9.9%-24.0%), and 5.9% for casino games (range 5.0%-9.0% in Victoria); (2) Comparisons of surveys conducted across time in the same jurisdictions suggest that rates of racing and casino table games remain relatively stable, whereas the prevalence of EGM gambling has declined; (3) The weighted mean estimate of problem gambling using the Problem Gambling Severity Index was 0.65% (range 0.5%-1.0%); (4) Of all gambling activities, EGMs appeared to have the strongest association with problem gambling.								
Delfabbro and King (2021)	NA	NA	NA	NA	NA	NA	Systematic Review	1	To examine the relationship between problem gambling severity as classified

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
									by the PGSI and endorsement of items known to be indicative of behavioural disorder under the current DSM-5 classification as well as in other reviews.
	# of included articles: k=17; Study design: Major prevalence studies in Australia; Participant type: General population (representative); Years covered: 2005-2019. Main findings: (1) This study revealed a weighted mean participation estimate of 67.1% (range from 53.0%-74.7%) for gambling on non-lottery-based products or gambling at least weekly or fortnightly; (2) Using the Problem Gambling Severity Index (PGSI), there was a weighted mean participation estimation of 5.4% (range from 1.0%-8.9%) for low-risk gambling, 2.0% (range from 0.8%-2.9%) for moderate-risk gambling, and 0.6% (range from 0.4%-1.0%) for problem gambling.								
Delfabbro, King, and Carey (2021)	International	Online panel	Gamblers And Video gamers	Gamblers: 554 Gamers: 471	NR	Gamblers: 64% Gamers: 81%	Cross-sectional	3	To compare the severity of harm in a comparative sample of problem gamblers and pathological gamers
	Main findings: Using an 'any attribution method' (in which the total counts are based on a softer scoring method where an item was endorsed if a respondent indicated that it had been at least a slight problem and was at least slightly related to either their gambling) yielded higher mean harm counts than using a 'moderate attribution method' (in which the total count of items are where the respondent had to rate the issue as at least a ‘Moderate problem’ and at least moderately due to gambling								
Delfabbro, Georgiou, et al. (2021)	International	Online panel	Gamblers	554	NR	64%	Cross-sectional	3	To examine how harm estimates for low and higher risk gambling varies when respondents are able to make more graded attributions of their harm to gambling
	Main findings: (1) Higher proportions of harm in low risk gamblers was identified when binary or 'any harm' scoring was used, but this effect mostly disappeared when more graded scoring or attribution of harm measures were used; (2) Higher risk PGSI groups consistently reported more harms and more serious harms than lower risk groups; (3) It was concluded that the measurement of gambling harm and its estimated distribution over PGSI categories is quite sensitive to how it is measured.								
Díaz and Pérez (2021b)	Spain	General population (representative)	General population	6342	NR	NR	Cross-sectional	1	To explore the relationship between online gambling participation and the prevalence of problem gambling by focusing not only on online gambling participation from a binary perspective, but also on its intensity.
	Main findings: (1) Using the DSM-IV screen, 93.74% of the sample were classified as non-problem gamblers and 0.836% had a likely diagnosis of pathological gambling; (2) 4.43% had mild but subclinical risk for gambling problems and 0.99% had moderate but subclinical risk; (3) Lifetime gambling participation was over 75% and past-year participation was 90%; (4) 8% reported lifetime online gambling, of which 74% reported past-year online gambling.								
Díaz and Pérez (2021a)	Spain	General population (representative)	General population	6617	Range: 18-95; M: 47.89; SD: 17.59	NR	Cross-sectional	1	To understand the drivers of consumer gambling by contributing to the study of determinants of gambling consumption focusing on how tobacco smoking and alcohol drinking, as the only legal

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
									substances in Spain, affect the likelihood of participation and expenditure in gambling.
	Main findings: (1) 76% of respondents reported lifetime gambling participation and 70% reported past-year gambling participation; (2) 35.44% of self-declared gamblers spent less than €10, 26.78% spent between €10 and €50, 5.76% spent between €50.01 and €100, 1.21% spent between €100.01 and €300, 0.26 % spent more than €300; (3) Non-gamblers obviously had no gambling expenditure at all (30.56%).								
Dowling, Youssef, et al. (2021a)	Australia	General population (representative)	General population	Sample 1: 4303 Sample 2: 5000 Sample 3: 2294 Sample 4: 2027	NR	S1: 56% S2: 56% S3: 47% S4: 63%	Cross-sectional	2,3	To derive a set of Australian low-risk gambling limits and explore the relative and absolute risk associated with exceeding these limits
	Main findings: (1) This study derived similar limits from disparate Australian states and territories with moderate classification accuracy (AUC>0.70): gambling frequency of 20-30 times per year; gambling expenditure of AUD $380-$615 per year; gambling expenditure comprising 0.83-1.68% of gross personal income; and two types of gambling activities per year; these limits did not differ by sex or age; (2) Gamblers who exceeded one limit generally exceeded more than one limit; and all limits, with the exception of number of gambling activities, predicted subsequent harms; (3) Exceeding the limits generally conferred a higher degree of relative and absolute risk, with gamblers exceeding limits being 3-20 times more likely to experience harm than those who do not; and having a 5-17% risk of experiencing harm; Only 7-12% of gamblers exceeding the limits actually experienced harm.								
Dowling, Greenwood, et al. (2021)	Australia	General population (representative)	General population	5000	NR	49%	Cross-sectional	3	(1) To compare low-risk gambling limits when gambling-related harm was defined using the negative consequence items of the Problem Gambling Severity Index (PGSI-Harm) and the Short Gambling Harms Screen items (SGHS-Harm); (2) To compare low-risk limits derived using a definition of harm in which at least two harms across different domains (e.g. financial and relationship) were endorsed with a definition of harm in which at least two harms from any domain were endorsed.
	Main findings: (1) Similar limits were derived using different measures of harm (PGSI and SGHS), with moderate classification accuracies (AUCs > .70): gambling frequency of 30-37 times per year; gambling expenditure of AUD $510-$544 per year; gambling expenditure comprising no more than 10.2-10.3% of gross personal income; 400-454 minutes per year; and two types of gambling activities per year; (2) A comparison of the limits derived using a definition of harm in which at least two harms across different domains (e.g., financial and relationship) were endorsed with a definition in which at least two harms from any domain were endorsed had a relatively negligible effect; (3) Exceeding the limits generally conferred a higher degree of relative and absolute risk, with gamblers exceeding limits being 3-10 times more likely to experience harm than those who do not; and having a 7-30% risk of experiencing harm.								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
Dowling, Youssef, et al. (2021b)	Australia	General population (representative)	General population	Sample 1: 4303 Sample 2: 5000 Sample 3: 2294	NR	S1: 56% S2: 56% S3: 47%	Cross-sectional	3	To identify and evaluate a set of empirically-based activity-specific limits (gambling frequency, gambling expenditure, gambling expenditure as a proportion of gross personal income, session expenditure, session duration)
	Main findings: (1) Not all activity-specific limits displayed acceptable classification accuracy; (2) Activity specific limits were identified for: EGMs (10 times per year, AUD$300 per year, 0.63–1.04% of gross personal income, AUD$35 per session, 40 minutes per session); horse/dog racing (0.55% of gross personal income, 380 minutes per year, AUD$25 per session, 25 minutes per session), instant scratch tickets (AUD$45 per year); lotteries (0.45% of gross personal income); keno (4–13 times per year, AUD$45–$160 per year); casino table games (AUD$345 per year, 0.36%–0.76% gross personal income); bingo (AUD$150 per year, 0.49% of gross personal income, AUD$17 per session, 90 minutes per session); and sports/other event betting (14 times per year, AUD$400 per year, 0.55–0.86% of gross personal income).								
Emond et al. (2020)	UK	General population (representative)	Gamblers	Wave 1: 2624; Wave 2: 1921	Wave 1 M: 20; Wave 2 M: 24	39%	Longitudinal	1, 2	To investigate stability of problem gambling between 20 and 24 years of age, and the antecedents and consequences of problem gambling at age 20 years.
	Main findings: (1) Using the PGSI, participants aged 20 and 24 years were respectively categorised in the non-problem gambling 71.1% and 78.2%), low-risk gambling (22.4% and 15.9%), moderate-risk gambling (5.5% and 4.4%), and problem gambling (1.0% and 1.5%) categories; (2) Moderate-risk/problem gamblers gambled on a wide range of activities, particularly on the internet, whereas non-problem gamblers limited their gambling to the lottery, scratchcards, football pools, and bingo; (3) There was a strong male gender bias, with males comprising 74.1% of moderate-risk/problem group at 20 years and 67% at 24 years; (4) Being in the moderate-risk/problem gambling category at age 20 was highly predictive of being in these categories at age 24 years (49% compared with low-risk gamblers and 1% of non-problem gamblers).								
Emond et al. (2021)	UK	General population (representative)	Young adults	2632	Range: NR; M: 27.8; SD: 0.6	29%	Longitudinal	1	To investigate whether during COVID-related lockdown, young males in particular would engage in more frequent gambling online compared to their previously reported gambling behaviours.
	Main findings: (1) During the COVID-19 lockdown, 79.6% of males and 91.0% of females did not gamble; 11.8% of males and 6.2% of females gambled less than once a week; and 8.6% of males and 2.9% of females gambled at least once a week; (2) At 24 years of age (previously reported), 32.6% of males and 42.9% of females did not gamble; 51.5% of males and 49.6% of females gambled less than once a week; and 15.9% of males and 7.5% of females gambled at least once a week; (3) During the COVID-19 lockdown, 83.6% of participants (77.9% males, 86.1% females) decreased their gambling frequency; 11.7% of participants (16.5% males, 9.6% females) had a stable gambling frequency; and 4.7% of participants (5.7% males, 4.3% females) increased their gambling frequency; (4) The most frequent gambling activities reported in both surveys were national lottery, scratch cards, online gambling and online betting.								
Engebo, Torsheim, and Pallesen (2021)	Norway	General population (representative)	General population	28251	NR	50%	Longitudinal	1	To examine if and how gambling behavior changed after the two regulatory changes: a restriction of availability when slot machines were banned from the Norwegian market in 2007 and the introduction of regulated online

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
									interactive games to the same market in 2014.
	Main findings: (1) A reduction in gambling participation from 2005 through 2018 was found, whereby the mean predicted probability of gambling was 82.1% for the first epoch (2005-2007), 76.3% for the second epoch (2008-2013) and 72.7% in the third epoch (2014-2018); (2) The clearest reduction is for land-based slot machines and interactive video terminals (IVTs) Multix, whereby the mean predicted participation was 18.7% in the first epoch, and 1.5% and 1.6% in the second two epochs; (3) gambling on foreign web sites (3.6%, 4.2%, 4.5%) and interactive games (0.7%, 1.6%, 5.6%) increased predicted participation; while gambling in land-based bingo premises showed the lowest overall participation (1.7%, 2.3% and 1.8%).								
Erdogdu and Arcan (2020)	Turkey	Schools	Adolescents	356	Range: 14-19; M: 17.09; SD: 1.33	74%	Cross-sectional	3	To test the validity and reliability of the Turkish version of the South Oaks Gambling Screen-Revised for Adolescents (SOGS-RA)
	(1) The Turkish version of the SOGS-RA demonstrated a uni-factorial structure; (2) Internal reliability was good (α=0.88); (3) The measure displayed good concurrent validity with a range of well-established problem gambling measures.								
Esparza-Reig, Guillén-Riquelme, Martí-Vilar, and González-Sala (2021)	NA	NA	NA	26743	NA	NA	Systematic review and meta-analysis	3	To analyse whether the SOGS is a reliable instrument and what characteristics of studies on the SOGS are linked to its reported reliability
	# of included articles: k=63; Study design: Experimental, quasi-experimental or prevalence studies; Participant type: Participants older than 18 years; Years covered: Up to January 2021. Main findings: (1) The mean internal consistency was good (α=0.86), but with high heterogeneity; (2) The variables that explain the most heterogeneity were the continent where the study was performed, application to participants with or without clinical problems, the form of administration of the questionnaire, and the standard deviation in the SOGS score.								
Evren, Evren, Dalbudak, Topcu, and Kutlu (2020)	Turkey	Universities	Young adults	Sample 1: 400 Sample 2: 326	S1: Range: NR; M: 24.3; SD: 6.83 S2: Range: NR; M: 23.54; SD: 4.44	S1: 54% S2: 60%	Cross-sectional	3	(1) To develop the Gambling Disorder Screening Test (GDST) (Study 1); (2) To validate the GDST psychometrically (Study 2)
	Main findings: (1) This study developed the Gambling Disorder Screening Test (GDST), a standardized measure that assesses symptoms and prevalence of gambling disorder (GD) regarding the American Psychiatric Association (APA) diagnostic framework; (2) The GDST comprised a uni-dimensional scale with a good internal consistency (α=0.92-0.93) and good item-total correlations; (3) The measure displayed good concurrent and criterion-related validity with a range of well-established gambling measures								
Forrest and McHale (2021)	UK	General population (representative)	Young adults	1058	M: 20	NR	Longitudinal	1,2	To examine the extent to which gambling problems at age 20 are linked to parental gambling behaviour during childhood (age 6).
	Main findings: (1) 10.8% of young adults (20 years) gambled weekly or more often; and using the PGSI, 4.4% were classified in the moderate-risk or problem gambling range (7.1% males, 1.2% females); (2) 24.8% of fathers and 1.3% of mothers with children aged 6 years recorded a positive score on								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
	the SOGS; (3) Parental gambling participation at child aged 6 was not a predictor of offspring problem gambling; but problem gambling by parents was a predictor of offspring problem gambling.								
Forsström, Lindner, Jansson-Frojmark, Hesser, and Carlbring (2020)	Sweden	General population (representative)	General population	2234	Range: 18-85; M: 51.4; SD: 16.2	53%	Cross-sectional	3	To explore the psychometric properties of GamTest (an instrument measuring gambling behaviour and negative consequences used by several gambling companies) in the general population
	Main findings: (1) The results revealed an inconclusive factor structure; (2) GamTest was significantly associated with the PGSI, and to a lesser extent, money spent; it was also significantly associated with measures of psychopathology; (3) All of the factors had high internal consistencies (ω = 0.79-91).								
Forsström, Rozental, Kottorp, et al. (2021)	Sweden	General population (representative)	General population	2234	Range: 18-85; M: 51.4; SD: 16.2	53%	Cross-sectional	3	To explore the response categories of the GamTest (an instrument measuring gambling behaviour and negative consequences used by several gambling companies) to determine whether there are valid incremental scale-steps, to examine the response pattern and goodness-of-fit between respondents and items, and to investigate the dimensionality of the instrument.
	Main findings: (1) Results indicated that the instrument could be improved by decreasing the scale-steps and removing several problematic items demonstrating misfit; (2) Some items functioned differently depending on gender; (3) A shortened, improved nine-item version could not differentiate between different levels of risk.								
Freeman, Volberg, and Zorn (2020)	USA	General population (representative)	General population	26	NR	89%	Cross-sectional	1	To assess problem gambling prevalence among veterans using non-Veterans Affairs data and to evaluate correlates of problem gambling among veterans in a general population sample.
	Main findings: (1) Using the PPGM, the prevalence of problem gambling was 1.3%; (2) Of the problem gamblers who had veteran status information, 20.6% were veterans; (3) Among veteran problem and at-risk gamblers, 78.2% were classified in the at-risk gambling range and 21.8% were classified in the problem gambling range.								
Gambling Commission (2020)	UK	General population (representative)	General population	11000	NR	NR	Cross-sectional	1	To provide an overview of consumer gambling behaviour in Great Britain in 2019, based on quarterly telephone and online tracking surveys conducted by Populus on behalf of the Gambling Commission
	Main findings: (1) In Great Britain in 2019, gambling participation has remained stable compared to 2018, with a past-four-week gambling participation estimate of 47% in 2019 (46% in 2018), with 51% of past four-week gamblers gambling at least once a week; The National Lottery draws remain the most popular gambling activity, followed by other lotteries and scratch cards; football and horse racing are the most popular betting activities; (2) The highest								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
	level of gambling participation was among the 45-54 age group (53%); however, if those who only participated in National Lottery draws are excluded, those in the age group 25-34 had the highest participation level (41%); (3) 21% have gambled online in the past four weeks, a significant increase since 2018; (4) The prevalence of problem gambling (according to the PGSI or DSM-IV screen) was 0.5%.								
Gambling Commission (2021)	UK	General population (representative)	General population	4005	NR	52%	Cross-sectional	1	To produce a statistical release covering the quarterly gambling participation and problem gambling prevalence data for the year to September 2021.
	Main findings: (1) In Great Britain in 2020, gambling participation had significantly declined compared to 2019, with a past-four-week gambling participation estimate of 42% in 2020 (47% in 2019); when respondents who have only taken part in National Lottery draws are excluded, the overall participation rate falls significantly from 32% in 2019 and 8% in 2020; The most popular gambling activities remained National Lottery draws (27%), followed by other lotteries (12%) and scratch cards (8%); (2) A larger proportion of men (45%) had participated in any form of gambling as had those aged 35-44 (46%), 45-54 (48%) and 55-64 (47%); Those in the youngest age group (16-24) had the lowest level of gambling participation (31%); Between 2019 and 2020, each gender and age category show some level of decline in participation rates; (3) Nearly 24% of adults had gambled online in the previous four weeks, which is a significant increase since 2019 (3 percentage points) and 2016 (6 percentage points); (4) Using the PGSI mini-screen, low-risk gambling was 2.0% (a significant decrease on the previous year), moderate-risk rate gambling was 0.9%, and the problem gambling rate was 0.3%.								
González-Cabrera et al. (2020)	Spain	Schools	Adolescents	883	Range: 11-19, M: 14.25, SD: 1.55	68%	Cross-sectional	3	To develop the Online Gambling Disorder Questionnaire (OGD-Q) for adolescents, evaluate its main psychometric properties, and establish diagnostic criteria to differentiate pathological from non-pathological online gamblers
	Main findings: (1) This study developed the Online Gambling Disorder Questionnaire (OGD-Q) for adolescents; (2) The OGD-Q comprised a uni-dimensional scale with good internal consistency (α=0.94) and good item-total correlations; (3) The OGD-Q displayed good convergent validity with a range of well-established measures.								
Granero, Jimenez-Murcia, et al. (2020)	Spain	General population (convenience) And Clinical (gambling)	Older adults	General population: 361 Clinical: 47	Gen popln: Range: 50+; M: 73.8; SD: 8.4 Clinical: Range: 50+; M: 73.8; SD: 8.5	Gen popln: 37% Clinical: 79%	Cross-sectional	3	To examine the presence of problematic and disordered gambling in seniors aged 50 or over, and study the reliability and validity properties of the SOGS (a screening measure to identify gambling related problems).
	Main findings: (1) The SOGS displayed a bifactor structure with two correlated underlying dimensions measuring the impact of gambling on the self primarily (α=0.87) or on both the self and others also (α=0.82), as well as a global dimension of gambling severity (α=0.90); (2) The SOGS obtained excellent accuracy/validity for identifying gambling severity based on the DSM-5 criteria (AUC=0.97 for discriminating disordered gambling and AUC=0.91 for discriminating problem gambling); (3) The SOGS displayed good convergent validity with external measures of gambling and psychopathology; (4) The optimal cut-off point for identifying gambling disorder was 4 (sensitivity=92.3%, specificity=98.6%) and 2 for identifying problem gambling (sensitivity=78.8%, specificity=96.7%).								
Griffiths and Nazari (2020)	Iran	Online panel	Gamblers	858	Range: 18-50; M: 27.2; SD: 6.3	73%	Cross-sectional	3	To investigate the reliability and validity of the Persian version of the PGSI

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
	Main findings: (1) The Persian version of the PGSI displayed a unidimensional structure, with good factor loadings; (2) The Persian PGSI displayed excellent internal reliability (α=0.90) and moderate test-retest reliability (ICC=.41); (3) The measure displayed good convergent validity and criterion-related validity with well-established measures of psychopathology.								
Harrison, Lau, and Ross (2020)	USA	General population (representative)	General population	43093	NR	NR	Cross-sectional	1	To examine the manner in which the population prevalence of disordered gambling has usually been estimated, on the basis of surveys that suffer from a potential sample selection bias
	Main findings: (1) Modelling the latent sample selection behaviour generated by these trigger questions using up-to-date econometrics for sample selection bias correction leads to dramatically different inferences about population prevalence and comorbidities with other psychiatric disorders; (2) The population prevalence of problem or pathological gambling in the United States is inferred to be 7.7% (8.3% moderately indicated gambling, 3.8% pathological gambling), rather than 1.3% (4.0% moderately indicated gambling, 0.4% pathological gambling) when sample selection biases are ignored.								
Hing et al. (2021) a	Australia	General population (representative)	General population	15000	NR	NR	Cross-sectional	1	To explore changes in interactive gambling in Australia since 2011/2012
	Main findings: (1) Since 2011/2012, overall gambling participation has decreased from 64.3% to 56.9%; (2) Estimates of problem gambling have doubled from 0.6% to 1.23%, but moderate-risk (3.1%) and low-risk (6.6%) gambling have remained steady; (3) Approximately 9.1% of the population reported at least one gambling-related harm to self and 6.0% reported being harmed by another person's gambling; (4) Compared to non-interactive gamblers, interactive gamblers were more likely to report higher gambling frequencies (lotteries, sports betting, race betting, poker, casino games and EGMs), higher gambling expenditure (instant scratch tickets, lotteries, sports betting, and race betting), problem gambling (3.9% cf. 1.4%), moderate-risk gambling (9.4% cf. 3.8%), low-risk gamblers (16.8% cf. 19.2%), and at least gambling-related harm to self (34.0% cf. 15.6%).								
Hollen et al. (2020)	UK	General population (representative)	Young adults	Wave 1: 3566, Wave 2: 3940, Wave 3: 3842	Wave 1 M: 17.8, SD:0.4; Wave 2 M: 20.9; SD:0.5 Wave 3: M: 24.9, SD:0.6	Wave 1: 42%, Wave 2: 39%, Wave 3: 35%	Longitudinal	1, 2	To explore young people's gambling activity at 17 years, 20 years, and 24 years, and to investigate the individual, familial, and environmental antecedents of regular gambling during this critical developmental period
	Main findings: (1) Past-year non-gamblers at 17 years tended to remain in the same category at 20 and 24 years, with about a third becoming past-year occasional (less than weekly) gamblers (28.9%), and very few becoming past-year regular (>= weekly) gamblers (1.8%) at 24 years; 70% of occasional gamblers at 17 years were still gambling occasionally at 20 and 24 years, with 23% stopping gambling and only 7% becoming regular gamblers at 24 years. Regular gamblers at 17 years continued gambling, with 56% being regular gamblers and 37% occasional gamblers at 24 years. Overall, the variation between categories was less between 20 and 24 years than between 17 and 20 years; (2) The proportion of young people who reported engaging in some form of gambling at least weekly increased from 9% at 17 years to 12.2% at 20 years and reduced to 11.2% at 24 years. The increase from 17 to 20 years and then decrease at 24 years was found in both males and females, but regular gambling was strongly male-dominated in all three age groups; (3) The major gambling activities for males were national lottery at 17 years, online betting at 20 and 24 years; for females were scratch cards and national lottery at 17, 20 and 24 years.								
Izutsu and Suzuki (2021)	Canada	General population (representative)	General population	38968	NR	44%	Cross-sectional	1	To investigate the relationship between a sense of community belonging and problem gambling in Canada and whether this relationship was modified by sex and marital status

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
	Main findings: Using the PGSI, the prevalence of problem gambling was 1.4% and was higher in males (1.9%) than in females (0.9%).								
(L. Jacob et al., 2021)	UK	General population (representative)	General population	6941	Range: NR; M: 46.3; SD: 18.6	49%	Cross-sectional	1	To investigate the association between problem gambling and functional disability
	Main findings: Using the DSM-IV diagnostic criteria, the prevalence of at-risk problem gambling was 3.3%.								
Kalkan and Griffiths (2021)	USA	Universities	Young adults	326	Range: 18-69; M: 25.2; SD: 7.63	39%	Cross-sectional	3	To modify the Gambling Symptom Assessment Scale (G-SAS) to assess the symptoms and consequences of online gambling disorder and explore the psychometric properties of this measure using exploratory factor analysis
	Main findings: (1) This study newly developed the Online Gambling Symptom Assessment Scale (OGSAS) by modifying the Gambling Symptom Assessment SCALE (GSAS); (2) The OGSAS displayed a three-dimensional factor structure (Dimension 1: 8 items, α=0.89); Dimension 2: 2 items, α=0.71; Dimension 3: 2 items, α=0.75); (2) The overall scale displayed good internal consistency (α=0.83).								
(Y. Kim, Lee, Park, & Lee, 2020)	Korea	Schools	Adolescents	1456	Range: 14-18; M: 16.56; SD: 1.24	44%	Cross-sectional	3	To evaluate the screening performance of the Korean version of the CAGI GPSS
	Main findings: (1) The Korean version of the CAGI GPSS displayed excellent model fit (unidimensional structure); (2) The CAGI GPSS displayed good internal consistency (α=0.88), although item 9 displayed poor item-total and inter-item correlations; (3) The measure displayed good convergent validity and criterion-related validity with well-established measures; (4) A score of 5 was determined to be the optimal cut-off value, with sensitivity exceeding .80, and specificity and hit rate becoming highest among the cut-off values with their sensitivity above .80.								
Levy et al. (2020)	USA	General population (representative)	Young adults	726	Range: 18-30; M: NR; SD: NR	54%	Longitudinal	1,2	To explore the association between developmental trajectories of sensation seeking in childhood/adolescence and gambling and gambling problems in early adulthood in individuals of Puerto Rican origin
	Main findings: (1) Using the CAGI, 46.6% reported past-year gambling participation and 9.2% reported behaviours consistent with gambling problems; (2) Approximately half of respondents in the normative, low, and accelerated developmental sensation-seeking classes reported gambling in the past year; however, in the high class, only 26.7% of respondents reported past-year gambling; Gambling problems were most prevalent (12.5%) among members of the normative class; (3) Among females, the prevalence of past-year gambling was fairly stable across sensation-seeking classes while for male past-year gambling was less prevalent in the high class than in the other sensation-seeking classes; For females, the highest prevalence of gambling problems was seen in the high class (8.9%) while for males gambling problems were most prevalent among the normative class (15.7%).								
Li, Mills, and Nower (2020)	USA	Online panel	Social casino game players	436	Range: 18-67; M: 30.59; SD: 10.76	56%	Cross-sectional	3	(1) To develop and validate a measure to assess problematic social casino gaming, using the most relevant criteria of problem video gaming and problem gambling; (2) explore the presence of subgroups, reflecting the severity of problematic social casino gaming; and (3) investigate differences in social casino

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
									gaming frequency, severity of problem gambling and video gaming across varying levels of problematic social casino gaming
	Main findings: (1) The Problematic Social Casino Gaming Scale (PSCGS) displayed a unidimensional structure, with good factor loadings; (2) The Persian PGSI displayed excellent internal reliability (α=0.95); (3) The PSCGS displayed a high level of precision; (4) The latent profile analysis of the PSCGS classified participants into three groups, representing different levels of problematic social casino gaming, with players classified as high severity playing social casino games more frequently, being more likely to spend money on social casino games, and evidencing greater severity of problem video gaming and problem gambling than other players.								
Lind, Hellman, Obstbaum, and Salonen (2021)	Finland	General population (representative)	General population	7186	Women M: 50.51; Men M: 50.53	48%	Cross-sectional	1	(1) To investigate possible associations between gambling severity and involvement in criminal behaviour in terms of criminal justice convictions; (2) To examine whether any associations detected are explained by confounding sociodemographic factors associated with gambling and criminal behaviour that has led to a conviction
	Main findings: Using the Problem and Pathological Gambling Measure (PPGM), 18.2% did not gamble in the past year, 69.6% had recreational gambling in the past year, 8.7% were at-risk gamblers in the past year, and 1.9% were identified as problem or pathological gamblers in the past year.								
Louderback, LaPlante, Currie, and Nelson (2021)	USA	Online gambling operator datasets	Online gambling subscribers	Sample 1: 2005 Sample 2: 3605 Sample 3: 1722	NR	NR	Longitudinal	3	(1) To develop lower risk limits for six measures of gambling involvement among subscribers to an online gambling operator; (2) To test the utility of these limits and three existing land-based limits for the BBGS outcome and proxies for gambling problems including: (1) voluntary self-limiting, (2) self-exclusion, (3) closing one's account, and (4) being assigned a flag for potential problem gambling by customer service.
	Main findings: (1) The study identified five optimal limits for lower risk online gambling with adequate sensitivity and specificity for predicting problem gambling status; (2) Four of these limits predicted at least one proxy outcome: wagering 167.97 Euros or less each month; spending 6.71% or less of annual income on online gambling wagers; losing 26.11 Euros or less on online gambling per month; and demonstrating variability (i.e., standard deviation) in daily amount wagered of 35.14 Euros or less during one's duration active (AUCs=0.66, sensitivity=0.56, specificity=0.70)								
Marmet, Studer, Wicki, Khazaal, and Gmel (2021)	Sweden	General population (representative)	Young men	5352	Range: NR; M: 28.26; SD: 1.27	100%	Cross-sectional	1	To examine in a cohort study sample of young Swiss men how their gambling activities and gambling-related problems differed across the spectrum from offline to online gambling

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
	Main findings: (1) 28.5% reported past-year gambling, with the most frequent gambling activity being playing lotteries (3.97 days per year on average), followed by internet gambling (1.69 days per year); (2) About 20% of the sample only gambled offline, 4.6% mostly gambled offline (1–25% of total money spent on gambling gambled online), 2.4% were mixed gamblers (25–90% of money gambled online), and 1.6% were almost-exclusively-online gamblers (>= 91% of money gambled online); (3) Of the total sample, 0.8% showed 4 or more DSM-5 GD symptoms, corresponding to 2.7% of gamblers.								
Mazar, Zorn, Becker, and Volberg (2020)	USA	General population (representative)	Regular gamblers	9523	NR	NR	Cross-sectional	1	1) To explore whether some gambling formats are more related to problem gambling; 2) To explore whether problem gambling is positively related to high involvement in gambling; 3) To examine the relationship between involvement in gambling and intensity of gambling; and 4) To explore whether gambling formats mediate the relationship between gambling involvement and problem gambling.
	Main findings: (1) Using the Problem and Pathological Gambling Measure (PPGM) in the sample of regular gamblers, the overall proportion of problem gamblers was 7.62%; (2) The highest proportions (ranging from 17.4%-26.0%) of individuals experiencing a gambling problem were among those who gambled regularly (monthly or more often) on casino games (26.0%), bingo (25.5%), sports betting (20.5%), private betting (18.0%), and daily lottery games (17.4%); (3) The lowest proportions (ranging from 7.6% -10.7%) of individuals experiencing a gambling problem were all lottery (7.6%), large jackpot lottery (8.2%), and instant/scratch tickets (10.7%).								
McLauchlan et al. (2020)	USA	Online panel and Clinical (gambling)	Gamblers	Panel: 532 Clinical: 198	Panel: Range: 18-87; M: 42.07; SD: 13.13 Clinical: Range: 18-39; M: NR; SD: NR	Panel: 62% Clinical: 64%	Repeated measures	3	To determine whether Likert scales were better suited to capture gambling harm than binary scales
	Main findings: (1) There was a general pattern of the Likert scoring method performing slightly better than the binary scoring method, but there were no significant differences between the two SGHS scoring formats on its internal consistency, test-retest, alternate-form reliability, and convergent or discriminant validity with measures of psychological distress, personal wellbeing, and impulsiveness; (2) The Likert scoring method did, however, correlate significantly higher with the PGSI than the binary scoring method.								
Merkouris, Dowling, Rodda, and Youssef (2020)	Australia	General population (representative)	General population	2027	NR	63%	Longitudinal	2	To: (1) examine the baseline predictors of transitions into and out of subsequent low- and moderate-risk gambling; and (2) explore profiles of gamblers who have transitioned into and out of low- and moderate-risk gambling at the final wave (as these variables could not be employed as predictors).

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
	Main findings: (1) Respondents' scores on the PGSI at each wave, were used to categorise their transition status into either: (1) remained non-gambling/non-problem gambling (Wave 1 to Wave 2: n=844; Wave 1 to Wave 3: n=653; Wave 2 to Wave 3: n=639); (2) transitioned into low- and moderate-risk gambling from non-gambling/non-problem gambling (i.e., developed risk; Wave 1 to Wave 2: n=32; Wave 1 to Wave 3: n=29; Wave 2 to Wave 3: n=38); (3) remained low- and moderate-risk gambling (Wave 1 to Wave 2: n=54; Wave 1 to Wave 3: n=36; Wave 2 to Wave 3: n=29); or (4) transitioned out of low- and moderate-risk gambling and into non-gambling/non-problem gambling (i.e., improved from risk; Wave 1 to Wave 2: n=94; Wave 1 to Wave 3: n=83; Wave 2 to Wave 3: n=35); (2) Compared to respondents who remained in the non-gambling/non-problem gambling group, respondents who transitioned into low- and moderate-risk gambling at a subsequent wave were more likely, at the previous wave, to report gambling motives, high-risk situations, psychosocial difficulties (e.g., hazardous alcohol use; impulsivity, lower quality of life, and lower coping), help-seeking, and low self-efficacy; (3) Compared to respondents who remained in the low- and moderate-risk gambling group, respondents who transitioned out of low- and moderate-risk gambling at a subsequent wave were less likely, at the previous wave, to report high-risk situations, gambling motives; access help and rate stopping/limiting gambling as a priority; and more likely to be born outside Australia, be of older age, have significant life events, and have higher self-efficacy.								
Merkouris et al. (2021)	Australia	General population (representative)	General population	1365	Range: 13-32; M: NR; SD: NR	46%	Longitudinal	1,2	To examine the extent to which: (1) mental health symptoms (depressive and anxiety symptoms) and substance use (weekly binge drinking, tobacco, and cannabis use) from adolescence (13–18 years) into young adulthood (19– 28 years) predict gambling problems in adulthood (31–32 years); and (2) risk relationships differ by sex.
	Main findings: (1) Using the PGSI, 10.26% had experienced any-risk gambling (low-risk, moderate-risk, or problem gambling) during adulthood; (2) Mental health models did not support associations between the experience of any-risk gambling and histories of either elevated depressive or anxiety symptoms; (3) After adjusting for potential confounding factors, substance use models revealed an increased odds of experiencing any-risk gambling in those with persistent histories of weekly binge drinking (OR = 3.42), tobacco use (OR = 2.50), and cannabis (OR = 2.30); (4) To a lesser extent, there was also an increased odds of experiencing any-risk gambling in those with young adult only histories of weekly binge drinking (OR = 2.54) and tobacco use (OR = 2.04).								
Molander et al. (2021)	Sweden	Convenience	Sample 1: Researchers, clinicians, trainers; Sample 2: Researchers; Sample 3: Gamblers	S1: 61 S2: 17 S3: 20	NR	S1: 68% S2: 17% S3: 20%	S1: Delphi S2: Consensus meetings S3: User experience	3	To develop the Gambling Disorder Identification Test (GDIT), as an instrument analogous to the Alcohol Use Disorders Identification Test and the Drug Use Disorders Identification Test
	Main findings: (1) The steps of the development of the Gambling Disorder Identification Test (GDIT) were: i) Identification of possible GDIT items; ii) International Delphi process and consensus meetings; iii) Evaluation of user experience; iv) Psychometric evaluation of the GDIT (reported separately); (2) Ten items fulfilled Delphi consensus criteria for inclusion in the GDIT (M ≥ 7 on a scale of 1–9 in the second round); (3) Item-related issues were addressed, and four more items were added to conform to the Banff agreement recommendations, yielding a final draft version of the GDIT with 14 items in three domains: gambling behaviour, gambling symptoms and negative consequences.								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
Moritz, Bücker, Wittekind, Gawęda, and Gehlenborg (2020)	Germany	Convenience	Gamblers	265	Range: 18-65; M: 35.37; SD: 10.62	76%	Cross-sectional	3	To examine the factorial structure of the Pathological Gambling Adaptation of the Yale-Brown Obsessive- Compulsive Scale (PG-YBOCS) to delineate similarities and differences between thoughts and behaviour related to pathological gambling (PG) versus obsessive-compulsive disorder (OCD)
	Main findings: (1) The PG-YBOCS demonstrated a two-factor structure, one dimension representing gambling severity and one dimension reflecting resistance to thoughts/urges and behaviour; (2) The scale demonstrated good internal consistency (α=0.89; severity: α=0.89; resistance: α=0.65); (3) Test-retest reliability was significant but only modest; (4) Severity, but not resistance, was strongly correlated with depression and the severity and functional relevance of gambling problems.								
O'Neil et al. (2020)	Australia	General population (representative)	General population	5009	NR	48%	Cross-sectional	1,3	1) To analyse key trends and comparisons with other states and territories, including, but not limited to: an update of the gambling industry structure and characteristics; changes and trends in gambling behaviour; and revenue; 2) To undertake a gambling prevalence study to enable comparisons with previous Tasmanian prevalence studies
	Main findings: (1) The proportion of Tasmanian adults participating in any gambling activity has steadily declined since 2008 (from 72% in 2008, to 65% in 2011, 61% in 2013, 59% in 2017 down to 47% in 2020), with higher gambling participation highest among people aged 55 to 64 years (56%) and lowest among people aged 18 to 24 years (34%); (2) Using the PGSI, 86.4% were classified in the non-problem gambling category, 9.1% were classified in the moderate-risk gambling category, and 0.8% were classified in the problem gambling category; (3) Using the Gambling Harm Measure, over-prioritisation (in at least one area of harm) was 0.7% in non-problem gamblers, 6.5% in low-risk gamblers, 27.9% in moderate-risk gamblers, and 90.5% in problem gamblers; pressures and strains were 0.4% in non-problem gamblers, 2.4% in low-risk gamblers, 29.1% of moderate-risk gamblers, and 90.0% of problem gamblers; and severe harms were almost non-existent in the low-risk groups (0-0.1%), but were reported by 24.0% of moderate-risk gamblers and 63.2% of problem gamblers; (4) The GHM displayed good internal consistency (KR-20=0.89-0.90) and GHM scores were positively related to PGSI scores (r=0.75).								
Otto et al. (2020)	NA	NA	NA	NA	NA	NA	Systematic Review	3	To evaluate screening instruments for gambling disorder to inform decision makers about choices for population-level screening
	# of included articles: k=3; Study design: Peer-reviewed studies that evaluated English-language screening instruments against a semi-structured diagnostic interview; Participant type: Adults (at least 80% were aged 18 years and older or a military or college population); Years covered: To May, 2017. Main findings: (1) 31 instruments from 60 studies identified, however, only three studies evaluating three instruments (SOGS, PGSI, MAGS-DSM-IV) were eligible for inclusion; (2) Sensitivity/specificity was 0.99/0.22 for SOGS (scores ≥ 5), 0.67/0.92 for PGSI (scores ≥ 8), and 0.34/0.99 for MAGS (scores ≥ 5); (3) Positive/negative predictive values were 0.03/0.99 for SOGS, 0.15/0.99 for PGSI, and 0.41/0.99 for MAGS.								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
Pallesen et al. (2021)	Norway	General population (representative)	Gamblers	Sample 1: 6034 Sample 2: 3232 Sample 3: 5830	NR	S1: 54% S2: 55% S3: 52%	Cross-sectional	1	(1) To investigate changes over time and identify predictors of online gambling among gamblers by using three Norwegian representative samples covering a 6-year (2013–2019) period; (2) To identify different characteristics (including video game participation and video gaming problems) of online compared to offline gamblers.
	Main findings: (1) Past-year gambling participation was 36.2% in 2013, 36.9% in 2015, and 46.1% in 2019; (2) Using the PGSI, non-problem gambling rates were 82.1% in 2013, 81.2% in 2015, and 79.0% in 2019; low-risk gambling rates were 12.9% in 2015, 13.2% in 2015 and 13.9% in 2019; moderate-risk gambling rates were 3.9% in 2013, 4.0% in 2015 and 2.1% in 2019; and problem gambling rates were 1.1% in 2013, 1.6% in 2015, and 2.1% in 2019; (3) For any mode of access, the probability of past-year online gambling online was lower in 2013 and 2019 than in 2015.								
Paterson et al. (2020)	Australia	General population (representative)	General population	NR	NR	NR	Longitudinal	1,2	To investigate the trajectories of social and economic outcomes and problem gambling risk in Australia
	Main findings: (1) Using the PGSI, 92.4% were classified in the non-problem gambling category, 4.0% were classified in the low-risk gambling category, 2.5% were classified in the moderate-risk gambling category and 1.0% were classified in the problem gambling category; (2) Compared to people who reported no gambling problems, people with problem gambling, and moderate-risk and low-risk gambling to a lesser extent, are more likely to report three or more financial hardships, overdue household and personal bills, less ability to pay of their credit card balances, taking above average financial risks, lower life satisfaction, high psychological distress, and negative major life events in the preceding waves.								
Raisamo, Kinnunen, Pere, Lindfors, and Rimpelä (2020)	Finland	General population (representative)	Young adults	18857	NR	42%	Cross-sectional	1	To examine changes in adolescents' gambling, gambling expenditure and gambling–related harms from 2011 to 2017 (2011, 2013, 2015, 2017) using comparable cross-sectional biennial survey data
	Main findings: (1) There was a significant decline in past-six-month gambling participation among minors (aged 12–16-year-olds) (from 39% in 2011 to 17 in boys and 20% to 5% in girls) while no significant changes were observed among 18-year-olds (who are not targeted by the law); (2) The mean gambling expenditure also declined from 2011 to 2017 (declined among boys but rose among girls); (3) Gamblers experienced significantly less gambling–related harms in 2017 (7.4%) compared to 2011 (13.5%) (the same decrease was found among boys and girls, but the decrease was not statistically significant among girls).								
Responsible Gambling Council (2020)	Canada	General population (representative)	Gamblers	2005	Range: 18-89; M: 48; SD: NR	50%	Cross-sectional	1	To understand the effects of the pandemic on Ontarian gamblers and make evidence-informed changes and improvements to community outreach and prevention programming
	Main findings: (1) Ontarian past-year gamblers typically engaged in in-person or land-based only gambling (76.7%) than a mix of both in-person and online gambling (13.6%) and online-only play (9.7%); (2) Using the PGSI, 71.7% were classified in the non-problem gambling category, 14.2% were classified in the low-risk gambling category, 6.5% were classified in the moderate-risk gambling category, and 7.6% were classified in the moderate-risk								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
	gambling category; (3) Among online gamblers, specifically, non-problem gambling was still most prevalent (65.6%), but moderate-risk gambling (8.2%) and problem gambling (12.8%) categories were much higher and statistically correlated with online play.								
Rey-Brandariz et al. (2021)	Spain	General population (representative)	General population	7841	NR	50%	Cross-sectional	1	To assess the prevalence of the Galician population who spent money on gambling in the last year and the prevalence of people with, or at risk of, gambling disorder
	Main findings: (1) Of the Galician population aged 16 years and over, 58.1% reported past-year gambling participation, with the prevalence increasing with age, reaching a maximum in the 45-64 age group, and higher in men, both globally (64.6% vs. 52.2%) and by age group; (2) The most common activities were lottery, pools, and draws, followed by online gambling; past-year online gambling was reported by 1.2% of the population; (3) 33.9% of the population playing the lottery, pools or draws did so weekly; (4) Using the SOGS, 0.4% had a gambling disorder and 1.2% had at-risk gambling; among gamblers; these prevalences were 0.7% and 2.1%, respectively; the prevalence of gambling disorder among gamblers was higher among men (1.3% vs. 0.1%) and in the 16-24 age group (2.4%).								
Schell, Godinho, and Cunningham (2021)	USA	Online panel	Gamblers	321	Range: NR; M: 36.5; SD: 10.9	45%	Longitudinal	3	To examine change in self-reported gambling measures over time as related to socially desirable responding bias
	Main findings: (1) Both impression management and social desirability scores were negatively correlated with baseline scores of the NORC DSM-IV screen for gambling problems (NODS) and the Gambling Symptom Assessment Scale (G-SAS), but not past-30 day amount of time spent gambling; the same pattern of results was observed in the separate analysis of males and females, except for a non-significant relationship between impression management and G-SAS among females; (2) Controlling for demographic variability, males with higher impression management scores demonstrated less change in NODS and G-SAS scores from baseline to 6-month follow-up compared to males with lower impression management scores; this relationship did not hold among females or among the full sample.								
Schluter, Hodgins, Thege, and Wild (2020)	Canada	Online panel	General population	6000	NR	46%	Cross-sectional	3	To examine the predictive utility of the Brief Screener for Substance and Behavioural Addictions (SSBA) to identify self-attributed addiction problems using a lay epidemiology perspective
	Main findings: (1) AUC values in relation to self-attributed addiction problems, perceived need for behaviour change, and past help-seeking were between 0.73 and 0.94, indicating moderate to high accuracy for these outcomes; (2) Using self-attributed problems as the criterion, the determined threshold score was 3 for six of the target behaviours (alcohol, tobacco, cannabis, cocaine, shopping, and gaming), and 2 for the remaining four behaviours (gambling, eating, sexual activity, and working); (3) Compared to other instruments assessing addiction problems, models using the SSBA provided equivalent or better model fit, and overall had higher classification accuracy in the prediction of self-attributed problems.								
Sleczka and Romild (2021)	Sweden	General population (representative)	General population	8165	Range: 16-84; M: 34.6, SD: 19.1	52%	Longitudinal	1,2	To estimate the association between baseline symptoms of gambling problems and (i) other symptoms, (ii) the overall severity of gambling problems after 12 months, and the estimated stability rates of various gambling problems after (iii) 12 months and (iv) 5 years.

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
	Main findings: (1) At-risk categories on the PGSI were overrepresented in the sample, with 12.21% reporting at least one symptom in the last 12 months; (2) After 12 months, 66% of the low-risk gamblers and 56% of the moderate-risk gamblers reported no problems; Among the baseline moderate-risk gamblers, 14% reported the same level of risk and 5% progressed to problem gambling; Problem gambling was rare but stable among 63% of baseline problem gamblers, with 25% reporting even more problems at the 12-month follow-up; (3) The stability rates were much lower for the 5-year follow-up.								
Spychala et al. (2021)	UK	General population (representative)	Young adults	4729	Range: 17-24; M: NR; SD: NR	39%	Longitudinal	1,2	To examine associations between disordered gambling and polygenic scores (PSs) for Big 5 traits to measure the shared genetic underpinnings of Big 5 personality traits and disordered gambling
	(1) Based on the PGSI, 0.8% were classified in the problem gambling category (0.2%, 05% and 0.7% at ages 17, 20 and 24 years, respectively); and 3.9% were diagnosed with lifetime problem gambling based on the DSM-IV diagnostic criteria (1.1%, 2.8% and 2.8% at ages 17, 20 and 24 years, respectively); (2) Polygenic scores for agreeableness and neuroticism significantly predicted PGSI scores over and above included covariates; Polygenic scores for agreeableness and neuroticism, when interactions with age were taken into account, also predicted DSM-IV scores.								
Sturgis (2020)	UK	General population (representative)	General population	Sample 1: 12161 Sample 2: 8034 Sample 3: 7676 Sample 4: 7748 Sample 5: 1003 Sample 6: 972	NR	NR	Cross-sectional	1	To describe the range of errors that may be present in the different survey estimates and assess which of the two surveys is likely to be most affected by these errors and in which ways
	Main findings: (1) Across five general population-representative surveys using random sampling in the UK from 2010 to 2016, prevalence estimates have ranged from 2.4-6.7% for low-risk gambling, 1.0-4.9% for moderate-risk gambling, and 0.4-2.3% for problem gambling; (2) An additional survey in 2016 surveying people aged 20 to 29 years indicated a low-risk prevalence rate of 6.5%, a moderate-risk rate of 2.0% and a problem gambling rate of 1.0%.								
Sturgis and Kuha (2021)	UK	General population (representative)	General population	Sample 1: 6691 Sample 2: 6927 Sample 3: 1795 Sample 4: NR Sample 5: 2049	NR	NR	Cross-sectional	1	To investigate how methodological differences between surveys affects the accuracy of estimates of gambling harm by eight surveys using a broadly consistent set of questions but different sampling and data collection methodologies
	Main findings: (1) Across five general population-representative surveys using random sampling in the UK from 2016 to 2021, prevalence estimates have ranged from 2.71-7.65% for low-risk gambling, 0.84-3.31% for moderate-risk gambling, and 0.38-1.92% for problem gambling; (2) Across these surveys, the proportion of participants scoring in the risk categories (PGSI>0) has ranged from 3.93-10.26%.								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
Syvertsen, Erevik, Hanss, Mentzoni, and Pallesen (2021)	Norway	General population (representative)	Gamblers	5830	Range: 16-74; M: 44.27; SD: 15.89	52%	Cross-sectional	1	(1) To examine if problem gambling was associated with perceived advertising impact (on gambling involvement, awareness, and knowledge) or exposure (via internet, TV, retail outlet, newspaper, and direct advertising); (2) To investigate if advertising exposure was associated with advertising impact.
	Main findings: Using the PGSI, 78.7% were classified in the non-problem gambling category, 13.9% were classified in the low-risk gambling category, 4.9% were classified in the moderate-risk gambling category, and 2.1% were classified in the problem gambling category.								
Tajin, Sakata, Khokhar, and Jenkinson (2021)	Australia	General population (representative)	General population	3602	NR	47%	Cross-sectional	1	To present estimates of the prevalence of gambling participation (any expenditure on gambling activities in a typical month in 2015), annual gambling expenditure and gambling-related problems among Victorians aged 18 years and over
	Main findings: (1) Past-month gambling participation was 36%, with most common gambling activities being lotteries (76%), EGMs (21%), race betting (17%), instant scratch tickets (12%) and sports betting (10%); (2) Using the PGSI among Victorian adult population, 29.4% were classified in the non-problem gambling category, 3.3 were classified in the low-risk gambling category, 2.1% were classified in the moderate-risk gambling category, and 0.9% were classified in the problem gambling category.								
Tekin, Guliyev, Yilmaz, Ogel, and Yuksel (2020)	Turkey	Clinical (gambling)	Gamblers	128	Range: 18-65; M: 33.87; SD: 8.12	97%	Cross-sectional	3	To develop a measurement tool suitable for determining the gambling risk levels in Turkey
	Main findings: (1) The 10-item Gambling Risk Screening Scale (GRSS), which evaluated the level of gambling risk, demonstrated a two-factor solution: one factor measuring gambling behaviour and one factor measuring economic and social problems; these subscales were significantly correlated with each other and the entire scale; (2) The GRSS displayed good internal consistency for the entire scale (α=0.88), gambling behaviour (α=0.82) and economic and social problems (α=0.89); (3) Against the SOGS, the measure displayed an AUC=0.82; the cut-off point was 9.5, sensitivity was 0.98 and specificity was 0.87; (4) GRSS scores were significantly correlated with SOGS scores.								
Tulloch et al. (2020)	Australia	General population (representative)	General population	15475	NR	47%	Cross-sectional	1	To identify prevalence, risk factors, and the complex of stressors and health-related consequences associated with family gambling problems (FGPs) as well as isolating the impact of FGPs on physical and psychological health problems.
	Main findings: Family gambling problems (FGPs) in the previous 12 months were found in 1.7% of households surveyed (this figure does not take into account where more than one person in the household had gambling problems).								
Walters (2021)	Australia	General population (representative)	Late adolescence	3089	Range: 15-18; M: 16.46; SD: 0.5	51%	Cross-sectional	1	To examine the impact of parent gambling involvement on the child delinquency–gambling relationship

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
	Main findings: Past-year gambling participation in this late adolescent sample was 15.8%.								
Wejbera et al. (2021)	Germany	General population (representative)	General population	11875	Range: 40-80; M: 59.2; SD: 10.8	51%	Cross-sectional	1	To determine risk factors, mental and physical health burden of probable Gambling Disorder for both men and women in the general population
	Main findings: Using the 2-item Lie/Bet Questionnaire, 2.1% were classified as individuals with probable gambling disorder; of which, 71.5% were male and 28.5% were female.								
Wieczorek, Biechowska, Dabrowska, and Sieroslawski (2021)	Poland	Convenience	Gamblers	300	Range: NR; M: 34.46; SD: 11.07	88%	Cross-sectional	3	To adapt the Problem Gambling Severity Index (PGSI) and Lie/Bet questionnaire (Lie/Bet) and assess their psychometric properties once translated for use with the Polish population
	Main findings: (1) The PGSI demonstrated a uni-factorial structure, good internal consistency (α=0.84), high predictive power (AUC=0.97), good sensitivity/specificity (0.91), and good positive/negative predictive values (0.93/0.90); (2) The Lie-Bet demonstrated a uni-factorial structure, relatively low internal consistency (α=0.60), high predictive power (AUC=0.91), good sensitivity/specificity (0.82/0.93), and good positive/negative predictive values (0.94/0.81).								
Williams, Leonard et al. (2021)	Canada	General population (representative)	General population	23952	NR	NR	Cross-sectional	1	To provide an updated profile of gambling and problem gambling in Canada and to examine how the rates and pattern of participation compare to 2002
	Main findings: (1) Past-year gambling participation was 66.2%, with lottery and raffle tickets the only type of gambling in which most participated; Overall participation rates have decreased, particularly for EGMs and bingo, with casino table games as the exception; (2) Past-year online gambling participation was 6.4%; (2) Most people were occasional gamblers, although there is a subgroup of people who purchase lottery tickets on a regular basis; (3) Using the PGSI, 33.8% were classified in the non-gambling category, 62.89% were classified in the non-problem gambling category, 2.7% were classified in the at-risk gambling range (low-risk gambling); and 0.6% were classified in the problem gambling range (moderate-risk/problem gambling); (4) Problem gambling and at-risk gambling have decreased since 2002, consistent with the overall decrease in gambling participation								
Williams, Leonard et al. (2021)	Canada	General population (representative)	General population	23952	NR	NR	Cross-sectional	1	To explore Indigenous gambling and problem gambling in Canada
	Main findings: (1) 75.3% of the Indigenous sample reported past-year gambling participation compared to 63.9% for non-Indigenous Canadians, with significantly higher rates of Indigenous participation for bingo, EGMs, and instant lotteries; (2) Using the PGSI, Indigenous Canadians have significantly higher rates of non-gambling (24.7% cf. 34.0%), non-problem gambling (68.4% cf. 62.8%), and at-risk gambling (low-risk gambling: 4.8% cf. 2.7%); they also have higher rates of problem gambling (2.0% cf. 0.5%), but this difference was not significant.								
Williams, Browne, Rockloff, Stuart, and Smith (2021)	Canada	General population (representative)	General population	4121	Range: 17-80; M: 46; SD: 14	46%	Longitudinal	1	To investigate the relationship between religious belief and gambling fallacies

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
	Main findings: (1) In the Quinte Longitudinal Study, approximately 25% were classified as being at risk of developing gambling problems; (2) In the Leisure, Lifestyle and Lifecycle Project, 29% were found to be at risk of gambling problems.								

Footnotes:
Subtheme 1: Prevalence of gambling participation, problems and harm in large-scale general population-representative surveys of adults; Subtheme 2: Risk and protective factors and transitions between levels of risk in longitudinal studies of adults; Subtheme 3: Psychometric properties of new and existing instruments for measuring gambling problems and harms

a – this report was published post search dates but was included on request from NSW ORG.

Table of Included Studies Theme 2: Individual and community level prevention and early intervention

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
Armstrong, Rockloff, Browne, and Blaszczynski (2020a)	Australia	Online panel	Gamblers	178	Range: 19 to 73 M:33.41; SD:9.64	57%	RCT	2	To explore whether an intervention designed to elicit analytical thinking was effective in altering the gambling beliefs and simulated gambling behaviour.
	Main findings: Results failed to show that priming for analytical thinking changed betting on an EGM; including features of bet size, bet change, persistence and theoretical losses. Contrary to expectations, results suggest that priming analytical thinking using generalised interventions does not appear to be effective in altering peoples' simulated gambling involvement or gambling beliefs. In fact, priming people to think more critically might be counterproductive by contributing to greater positive expectations about gambling outcomes. The results further suggested that the number of times a player alters their bet is a good indicator of theoretical gambling losses and is associated with irrational gambling cognitions. Interventions designed to promote safer thinking in gamblers should be implemented with care, as results from our study suggest that encouraging critical thinking in at-risk or problem gamblers may not be effective in reducing risky gambling.								
Armstrong et al. (2020b)	Australia	Online panel	Gamblers	94	Range: 19 to 65 M: 36.61; SD: 9.76	47%	RCT	2	To test whether a four-week online intervention to strengthen contextual analytical thinking in gamblers is effective in changing gamblers cognitions and encouraging safer gambling consumption.
	Main findings: The experimental condition reported significantly fewer erroneous cognitions, greater endorsement of protective cognitions, and reduced time spent gambling post-intervention compared to baseline. The control group also reported a reduction in cognitions relating to predicting and controlling gambling outcomes. Cognitive interventions that encourage gamblers to challenge gambling beliefs by reflecting on gambling involvement and promoting critical thinking may be an effective tool for reducing the time people invest in gambling activities.								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
Bagot et al. (2020)	Australia	General population (convenience)	Gamblers	411	NA	NA	Longitudinal	3	To determine the predictors of intention to use self-help strategies and the actual use of strategies.
	Main findings: Results indicated 92% of gamblers attempted at least one strategy to stick to their limits over the 30-day period (median = 30 strategies). Gamblers indicated a positive attitude towards strategy engagement and perceived themselves as having control over their use but the role that important other (e.g., family members) could play in strategy implementation warrants further examination. To improve strategy engagement, prevention and intervention programmes should target factors associated with intentions rather than focusing on behaviour.								
Blank et al. (2021b)	NA	NA	NA	NA	NA	NA	Systematic Review	2	To identify interventions to screen for risk of gambling-related harm in the general population which may be delivered in health, care and support settings
	# of included articles: k=22; Study design: No limit; Study participants: any attendee in help, care and support settings; Years covered: 2013-2019. Main findings: Health, care and support services offer potentially important contexts in which to identify and offer support to people who are at risk of gambling related harm. Screening interventions appear feasible and acceptable in a range of community and healthcare settings for those at risk of gambling harm. Evaluation of effectiveness and cost-effectiveness of screening in these populations should therefore be prioritised.								
Bond et al. (2020)	Australia	People who downloaded guidelines	Community	142	NR	NR	Cross-sectional	2	To evaluate the usefulness of the online mental health first aid guidelines for helping someone with gambling problems.
	Main findings: The majority (93%) found the guidelines useful. Thirty-five per cent helped someone after downloading the guidelines and thought that the guidelines contributed to a successful outcome. Half of those who received help from the participants went on to seek professional assistance. Although this study has limitations, it appears that the mental health first aid guidelines for helping someone with gambling problems may be a useful and effective tool for providing members of the public with basic supportive skills. Further work needs to be done to increase the reach and impact of these guidelines.								
Booth et al. (2021)	New Zealand	Websites and forums	Affected others	329 websites	NA	NA	Qualitative	3	To develop a comprehensive data-driven taxonomy of the types of self-help strategies used by affected others, and to categorize these into high-level behaviour change techniques.
	Main findings: The family-focused classification contained 16 Behaviour Change Techniques, and the most frequent were professional support, financial management and planned consequences. The gambler-focused classification contained 11 BCTs, and the most frequent were feedback on behaviours, professional support and financial management. The majority of family- and gambler-focused BCTs fell under the actional phase. Grounded in lived experience, the findings highlight the need for intervention and resource development that includes a wide range of specific techniques that affected others can utilise.								
Chóliz et al. (2021)	Spain	Schools	Youth	2372	Range: 14-19; M: NR; SD: NR	NA	Single-arm trial	1	To evaluate the effectiveness of the prevention program using objective behavioural and clinical measures recorded before and after applying the prevention program.

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
	Main findings: Statistically significant reductions were observed in the three variables of interest: monthly frequency of gambling, percentage of adolescents with risky gambling, and percentage of adolescents with gambling disorder. Applying the prevention program indicates it is effective as a universal prevention program for gambling addiction.								
S. R. Currie et al. (2020)	Canada	Online panel	Gamblers	10054	NR	NR	Cross-sectional	3	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.
	Main findings: The most common 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 effectiveness of remaining within one's personal spending limit decreased for those whose limits exceed $200CAN monthly.								
Heinlein, Rugle, Potts, Welsh, and Himelhoch (2021)	USA	Clinical (Gamblers)	Gamblers	15	Range: NR; M: 49.48; SD: 3.26	60%	Single-arm pilot trial	2	To evaluate the feasibility, acceptability and preliminary outcomes of a gambling specific Screening, Brief Intervention and Referral to Treatment (SBIRT) intervention in a medical setting.
	Main findings: A gambling specific Brief Intervention and Referral to Treatment intervention was feasible to deliver and acceptable to participants. Gambling specific outcome measures were reduced at 1-month follow-up, with individuals who endorsed four or more diagnostic criteria for gambling displaying the greatest reductions (26 days vs. 21 days; $400 vs. $65). A randomized control trial to evaluate the efficacy of the intervention is a recommended next step.								
Låftman et al. (2020)	Sweden	Schools	youth	5123	Range: 17-18; M: NR; SD: NR	NR	Cross-sectional	1	To investigate the association between teacher-rated school ethos and student-reported gambling and risk gambling, when controlling also for sociodemographic characteristics at the student- and the school-level.
	Main findings: Analyses showed that higher teacher ratings of the school's ethos were associated with a lower likelihood of gambling and risk gambling among students, when adjusting for student- and school-level sociodemographic characteristics. This study showed that school ethos was inversely associated with students' inclination to engage in gambling and in risk gambling. In more general terms, the study provides evidence that schools' values and norms as reflected by the teachers' ratings of their school's ethos have the potential to counteract unwanted behaviours among students.								
Lopez-Fernandez and Kuss (2020)	NA	NA	NA	NA	NA	NA	Systematic Review	1	To critically analyse online harms by addressing: (1) the cross-cultural approach adopted within the EU, (2) user characteristics, (3) Internet use-related addiction and the interventions to target the harms in Europe, (4) its implications

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
									at a public health level with an eye towards prevention.
	# of included articles: k=19; Study design: Quantitative, qualitative, and mixed methods approaches Participant type: Community and clinical samples Years covered: 2013-2018. Main findings: The individuals with problematic use were found to be educated adolescents, usually young males with comorbid disorders, and gaming and gambling disorders were implicated in the most severe cases. Cognitive behavioural therapy was the main treatment, sometimes combined with a systemic approach for adolescents. Prevalence, high-risk populations, and factors contributing to these addiction problems are discussed, and a set of policy options are developed for this region. The implications for early detection, diagnosis, treatment, and prevention in Europe are considered.								
McAfee, Martens, Herring, Takamatsu, and Foss (2020)	Canada	Universities	Gamblers	255	Range: NR; M: 22.21; SD: 4.09	62%	RCT	2	To examine the efficacy of personalized feedback-based interventions delivered via smartphone and text message.
	Main findings: The personalized text condition did not provide greater efficacy in changing gambling-related outcomes over general educational messages with personalized feedback.								
Ortega-Baron, Gonzalez-Cabrera, Machimbarrena, and Montiel (2021)	Sweden	Schools	Youth	165	Range: 11-14; M: 12.11; SD: 0.89	38%	Single-arm trial	1	To assess the effectiveness of the Safety.net program in a pilot sample.
	Main findings: The intervention group demonstrated improvements compared to the control group concerning online grooming, problematic Internet use, internet gaming disorder, and nomophobia. No effects were found concerning online gambling disorder.								
Peterson et al. (2021)	NA	NA	NA	NA	NA	NA	Systematic review	3	To provide an overview of the literature on protective behavioural strategies (PBS) and measures for various risk behaviours, and common interventions used in conjunction with strategies.
	# of included articles: k=34; Study design: NR Participant type: NR; Years covered: NR. Main findings: Research on interventions targeting PBS is lacking in areas outside of alcohol use. Just one study involved a validated tool for gambling. Within alcohol use, the utility of interventions varies widely. Understanding the reason for this discrepancy is an important area for future research.								
Rodda (2021)	NA	NA	NA	NA	Range: 15-42; M: 30.2; SD: NR	Range: 45%-96%; M: 4.1%; SD: NR	Systematic review	2	To summarise the existing literature on the effectiveness of prevention, harm reduction and early intervention programs when delivered online.
	# of included articles: k=15; Study design: Studies that evaluated internet delivered interventions for the prevention, harm reduction or early intervention of gambling problems; Years covered: 2000-2020. Main findings: The quality of the literature was variable with just 8 randomised controlled trials with the remainder matched controls or longitudinal cohort studies. The target group was predominantly gamblers accessing betting and casino websites (n = 8).								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
	Studies administered four types of interventions which included personalised and normative feedback, limit setting, self-directed cognitive and behavioural therapy and self-exclusion. These were delivered via customer gaming accounts, email, and self-learning packages. The available literature shows promise in the effectiveness of internet delivered interventions. However, the limited number of studies included in this review highlight significant lost opportunities to leverage technology in the prevention and reduction of gambling harm.								
Saxton et al. (2021)	NA	NA	NA	NA	NA	NA	Systematic Review	2	To determine the efficacy of PNF alone, and in combination with other self-directed interventions, to address frequency and symptom severity of hazardous alcohol use, problem gambling, illicit drug and tobacco use.
	# of included articles: k=30; Study design: RCT; Participant type: NR; Years covered:2000-2019. Main findings: PNF alone, and with additional interventions, reduced short-term alcohol frequency and symptom severity. PNF with additional interventions reduced short-term gambling symptom severity. Effect sizes were small. PNF did not alter illicit drug use. Findings highlight the efficacy of PNF to address alcohol frequency and symptom severity. The limited number of studies suggest further research is needed to ascertain the efficacy of PNF for gambling and illicit drug use. Cost-effectiveness analyses are required to determine the scale of PNF needed to justify its use in various settings.								
Shead, Champod, and MacDonald (2020)	Canada	Universities	Students	59	Range: NR; M: 21.6; SD: NR	10%	Single-arm trial	2	To determine if meditation practice may be a useful intervention to reduce cravings and impulsivity among gamblers.
	Main findings: Contrary to hypothesis, gambling measures were not correlated with delay discounting. However, dispositional mindfulness was inversely related to a self-report measure of impulsivity and problem gambling severity.								
So et al. (2020)	Australia	General population (convenience)	Gamblers	197	Range: NR; M: 36.3; SD: 10.4	79%	RCT	2	To develop a low-dropout unguided intervention named GAMBOT integrated with a messaging app and investigate its effect.
	Main findings: Compared daily monitoring, personalised feedback, and private messages based on cognitive behavioural theory offered to participants in the intervention group through a messaging app for 28 days (GAMBOT) to a control receiving biweekly messages only for 28 days (assessments only). No significant between-group differences found on gambling problems but gambling urges were significantly less in experimental group. 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.								
Tani, Ponti, Ghinassi, et al. (2021)	Italy	Schools	Teachers, youth	Total: 33 teachers; 393 students Training group:	Training group (teachers): Range: NR; M: 52.27; SD: 5.93 Non-training group (teachers):	Teachers 31% Students: 84%	RCT	1	To develop a gambling primary intervention program for students through the training of teachers about gambling-related knowledge and problems, and verify the effectiveness of the program in reducing gambling behaviours, cognitive distortions, and perception of gambling economic profitability in students.

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
				15 teachers; 219 students Non-training group: 18 teachers; 174 students	Range: NR; M: 50.22; SD: 9.99 Training group (students): Range: 13-19; M: 16.21; SD: 1.40 Non-training group (students): Range: 13-19; M: 16.57; SD: 1.36				
	Main findings: Results showed that trained teachers improved their knowledge on gambling types and characteristics and related risks. The most relevant result was the impact the trained teachers had on their students, who reduced their gambling behaviour, some cognitive distortions, and misconceptions related to the economic profitability of gambling. However, despite the relevance of these results, this study represents preliminary evidence, and further controlled studies are needed to confirm the possibility of using trained teachers as a less expensive method to efficiently prevent gambling among adolescents.								

Footnotes:

Subtheme 1: Prevention; Subtheme 2: Early Intervention; Subtheme 3: Self-management

Table of Included Studies Theme 3: Efficacy and effectiveness of treatments

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
Baño et al. (2021)	Spain	Clinical (gambling)	Gamblers	214	Range: NR; M: 49.2; SD: 12.3	0%	Chart review	1,2	(1) To estimate the short-term effectiveness in women with GD of a group standardized cognitive-behavioural therapy (CBT). (2) To identify the most relevant predictors of the primary therapy outcomes (dropout and relapse).

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
	Main findings: (1) 42.1% of participants undertaking a 16-week course of outpatient group CBT dropped out and 35.4% of participants relapsed at least once; (2) Dropout was associated with lower gambling severity and higher psychopathological distress and relapse was associated with divorced status, lower education and social position, nil gambling debts, preference for non-strategic gambling, and substance use.								
Bartel et al. (2020), study 1	Canada	Convenience	Gamblers	1	27	100%	Case study	1	To extend and customize DoNamic, an existing web-based app for treating depression, to also treat young adults who experience comorbid problem gambling.
		Convenience	Gamblers	5	Range: 25-38; M: 31.6; SD: 5.86	60%	Case series		
	Main findings: (1) The app was potentially feasible and usable, as participants reported mild-to-moderate satisfaction and nil major technical problems; (2) Recruitment was a challenge, however, and the app encountered low adherence and content consumption and mixed appraisals of learnability, efficiency, and cognitive load.								
Baxley et al. (2021)	USA	Clinical (AOD)	Gamblers	109	Range: NR; M: NR; SD: NR	61%	RCT	2,6	To examine the trajectories of non-gambling outcomes of three brief PG interventions (i.e., brief psychoeducation, brief advice, motivational enhancement therapy plus cognitive-behavioural therapy [MET + CBT]) among methadone maintenance treatment (MMT) patients.
	Main findings: (1) Regardless of the intervention, trajectories exhibited significant decreases in psychological distress and psychiatric problems over time, and motivational enhancement therapy and CBT also exhibited lower medical problems over time; (2) Trajectories also showed that men exhibited less distress and psychiatric problems across time than women and those with more severe opioid dependence exhibited a greater decrease in psychiatric problems from baseline to five months, but a subsequent increase across five to 12 months.								
Blank, Baxter, Woods, and Goyder (2021a)	NA	NA	NA	NA	NA	NA	Systematic mapping review	1	To identify review-level evidence for interventions to address or prevent gambling-related harms and explore policy implications, using stakeholder consultation to assess the evidence base, identify gaps, and suggest key research questions.
	# of included articles: k=22; Study design: No limit; Participant type: users of health, care and support services; Years covered: From 2012. Main findings: (1) The review identified nine peer-reviewed articles and 13 grey literature reports, which provided evidence, albeit somewhat poor quality and low quantity, to support the feasibility and use of Brief Intervention and Referral to Treatment in general practice, mental health services, and substance use treatment; (2) Future studies are needed to evaluate the acceptability, effectiveness, and cost-effectiveness of screening and brief interventions.								
Blank et al. (2021b)	NA	NA	NA	NA	NA	NA	Systematic Review	6	To identify interventions to screen for risk of gambling-related harm in the general

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
									population which may be delivered in health, care and support settings.
	# of included articles: k=22; Study design: No limit; Participant type: users of health, care and support services; Years covered: From 2012. Main findings: (1) The review identified nine peer-reviewed articles and 13 grey literature reports, which provided evidence, albeit somewhat poor quality and low quantity, to support the feasibility and use of Brief Intervention and Referral to Treatment in general practice, mental health services, and substance use treatment; (2) Future studies are needed to evaluate the acceptability, effectiveness, and cost-effectiveness of screening and brief interventions.								
Bucker, Gehlenborg, Moritz, and Westermann (2021)	Germany	Online panel	Gamblers	150	Range: NR; M: 35.03; SD: 11.27	67%	RCT	1,2	To investigate the feasibility, acceptance, and effectiveness of a self-guided Internet-based intervention targeted at gambling problems compared to a waitlist control group.
	Main findings: (1) No between-group differences were observed, as both the treatment and control group demonstrated significant reductions in gambling symptoms (strong effect size cf. medium effect size), as well as the secondary measures of gambling cognitions and depressive symptoms; (2) Participants in the treatment group with higher gambling and depressive symptoms, older age, and comorbid anxiety showed significant improvements compared to the waitlist group; (3) In terms of feasibility and acceptability, 43.3% of participants completed the post-assessment, of which 96.5% of completers rated the intervention as useful.								
Di Nicola et al. (2020)	NA	NA	NA	NA	NA	NA	Meta-review	1	To assess systematic reviews and meta-analyses relevant to the pharmacological, psychosocial, and combined treatment of adults with pathological gambling, to identify possible agreed-upon standards of care.
	# of included articles: k=26; Study design: Systematic reviews and meta-analyses; Participant type: Adults with gambling disorder; Years covered: Up to April 29, 2019. Main findings: (1) CBT was the most common approach used and produced the strongest relative treatment evidence for reducing global severity, gambling frequency, and monetary loss; (2) Weaker evidence was found for MI, as a standalone or adjunctive treatment to CBT, for improving gambling domains in the short-term and self-help treatments for fostering treatment-seeking; (3) Weaker evidence was also found for opioid antagonists and mood stabilisers for reducing gambling symptomatology and for lithium as a particularly effective medication for individuals with comorbid bipolar disorders.								
(Dowling, Merkouris, et al., 2021)	Australia	Convenience	Gamblers	206	NR	64%	Randomised trial with pragmatic features	1,2	To compare the effectiveness of an online self-directed cognitive- behavioural gambling program (GAMBLINGLESS) with and without therapist-delivered guidance.
	Main findings: (1) Both groups demonstrated significant reductions in gambling symptom severity, urges, frequency, expenditure, and psychological distress across the 24-month trial, which remained after controlling for other help-seeking and clinically significant changes in gambling symptom severity; (2) The guided group demonstrated additional treatment gains, however, with greater improvements observed in gambling urges and frequency, within-group change in quality of life, and clinically significant change (77% cf. 61%); (3) Gambling problems on EGMs only and importance of change predicted better short-term improvements in gambling symptom severity; internet use and female gender predicted better long-term treatment outcomes; and age, internet use, self-directed actions, and self-efficacy predicted better treatment engagement.								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
Ede et al. (2020)	Nigeria	Universities	Gamblers	40	Range: 18-30; M: 22.98; SD: NR	70%	RCT	1	To examine the effectiveness of group cognitive-behavioural therapy (GCBT) on pathological gambling among Nigerian students.
	Main findings: Relative to a waitlist control, the treatment group demonstrated significant reductions in pathological gambling symptomatology and gambling symptom severity at post-intervention and a one-month follow-up, providing evidence for the short-term benefits of group CBT for gambling.								
Erevik et al. (2020)	Norway	Clinical (gambling)	Gamblers	67	Range: NR; M: 39.7; SD: 10.9	64%	Chart review	1	To evaluate the outcomes of a CBT-based remote intervention for problem gambling in terms of gambling behaviour, gambling-related cognitions and mental health.
	Main findings: While follow-up completion rates were low (37.3%), the results showed significant reductions in gambling behaviour, problems, cognitions (large effect) and mental health symptoms (moderate effect) from pre-intervention to post-intervention and to a 6 to 12-month follow-up.								
GambleAware (2020c)	UK	Data Reporting Framework database	Gamblers	1000	Range: NR; M: NR; SD: NR	NR	Treatment statistics	1	To evaluate the capacity and uptake of GameChange, GamCare's pilot computerised CBT (cCBT) program for problem gambling compising eight weekly modules in its first four months of delivery.
	Main findings: (1) Preliminary data revealed high uptake rates that indicated high demand and initial accessibility, as 1000 users registered within the first four months, of which 789 completed the screening process, 133 actively used the programme, and 20 completed the programme; (2) Anecdotal evidence revealed that the programme increased respondents' gambling-related self-awareness, agency, self-determination, and control; (3) Preliminary data also identified areas of improvement that indicate a need for increased funding, such as a need for additional administrators and therapists to reduce wait times (average of 14 days) between programme screening and approval for use.								
GambleAware (2020b)	UK	Data Reporting Framework database	Gamblers	9008	Range: NR; M: NR; SD: NR	75%	Treatment statistics	1	To report client characteristics, gambling profiles, and treatment engagement and outcomes in the UK for the 2019-2020 period.
	Main findings: (1) 90-92% of referrals were self-made; first appointments were held within three days of initial contact for 50% of clients and eight-to-nine days for 75% of clients; median treatment duration was eight (2019/20) to ten weeks (2018/19); (2) Compared to 2015/16 data, treatment completion rates increased (59% cf. 69%) and dropout rates decreased (35% cf. 24-25%), with higher dropout rates seen among those who were unemployed (32-37%); and (3) 60-61% of problem gamblers at the start of treatment no longer met criteria at the end of treatment and the rate of clients defined as below the clinical cut-off for psychological distress increased from 15-17% to 55%.								
GambleAware (2020a)	UK	Data Reporting Framework database	Gamblers	7675	Range: NR; M: NR; SD: NR	79%	Treatment statistics	1	To report client characteristics, gambling profiles, and treatment engagement and outcomes in the UK for the 2018-2019 period.
	Main findings: (1) 90-92% of referrals were self-made; first appointments were held within three days of initial contact for 50% of clients and eight-to-nine days for 75% of clients; median treatment duration was eight (2019/20) to ten weeks (2018/19); (2) Compared to 2015/16 data, treatment completion								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
	rates increased (59% cf. 69%) and dropout rates decreased (35% cf. 24-25%), with higher dropout rates seen among those who were unemployed (32-37%); and (3) 60-61% of problem gamblers at the start of treatment no longer met criteria at the end of treatment and the rate of clients defined as below the clinical cut-off for psychological distress increased from 15-17% to 55%.								
GambleAware (2021b)	Wales	Data Reporting Framework database	Gamblers	271	Range: NR; M: NR; SD: NR	68%	Treatment statistics	1	To report client characteristics, gambling profiles, and treatment engagement and outcomes in Wales for the 2019-2020 period.
	Main findings: (1) 84% of referrals were self-made; first appointments were held within four days of initial contact for 50% of clients and seven days for 75% of clients; median treatment duration was 10 weeks; (2) Compared to 2015/16 data, treatment completion rates increased (64% cf. 80%) and dropout rates decreased (28% cf. 15%); (3) 57% of problem gamblers at the start of treatment no longer met criteria at the end of treatment and the rate of clients defined as below the clinical cut-off for psychological distress increased from 10% to 58%.								
GambleAware (2021a)	Scotland	Data Reporting Framework database	Gamblers	295	Range: NR; M: NR; SD: NR	77%	Treatment statistics	1	To report client characteristics, gambling profiles, and treatment engagement and outcomes in Scotland for the 2019-2020 period.
	Main findings: (1) 92% of referrals were self-made; first appointments were held within six days of initial contact for 50% of clients and nine days for 75% of clients; median treatment duration was 5 weeks; (2) Compared to 2015/16 data, treatment completion rates increased (51% cf. 58%) and dropout rates decreased (43% cf. 29%); (3) 54% of problem gamblers at the start of treatment no longer met criteria at the end of treatment and the rate of clients defined as below the clinical cut-off for psychological distress increased from 15% to 54%.								
GREO (2020)	NA	NA	NA	NA	NA	NA	Systematic rapid review	1,2	To provide an updated evidence base on treatment and support for problem gambling in order to inform future growth, improvement, and evaluation of problem gambling treatment services across Great Britain.
	# of included articles: k=93; Study design: No limit; Participant type: people with gambling problems; Years covered: From 2009 (systematic reviews and meta-analyses) and 2014 (single studies) to 14 November 2019. Main findings: (1) CBT remains the most evidence-based gambling treatment in the short- and long-term across gambling types and levels; and motivational interventions, remote and self-help interventions, and helplines may be useful for increasing historically low treatment uptake; with individuals with complex presentations likely benefitting from gambling treatment that addresses comorbidities and/or residential treatment; (2) involving concerned significant others in treatment may reduce their experience of gambling harms; (3) there is a dearth of high-quality research examining treatment effectiveness, particularly in the longer-term, for pharmacological interventions, brain stimulation, and Gamblers Anonymous; (4) future research may benefit from exploring emerging treatment modalities (e.g., cognitive remediation; art therapy), particularly among underserviced populations.								
Gan, Zhang, Han, Zhu, and Li (2020)	China	Clinical (mental health)	Bipolar disorder (BD) with comorbid obsessive-compulsive disorder	1	22	100%	Case study	1	To explore the use of ziprasidone, an atypical antipsychotic, in the treatment of a young Chinese man with bipolar disorder and comorbid obsessive-compulsive and gambling disorders.

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
			(OCD) and gambling disorder (GD)						
	Main findings: (1) While several medications were administered (e.g., antipsychotics and antidepressants), apparent improvement in the patient's presentation (stable mood; nil obsessive-compulsive symptoms; only occasional gambling) was only observed following the addition of flexibly dosed ziprasidone, followed by one year of ziprasidone monotherapy; (2) While the underlying mechanisms are unclear, this case study suggests that ziprasidone may be a useful adjunctive medication to consider in the treatment of such complex comorbidities.								
Gavriel-Fried, Moretta, and Potenza (2020)	Israel	Clinical (gambling)	Gamblers	140	Range: 23-77; M: 49.15; SD: 13.93	72%	Chart review	2	To investigate the associations between symptom improvement in gambling disorder and positive resources operationalized as recovery capital (internal and external resources that individuals may draw upon during the recovery process) and intrinsic spirituality.
	Main findings: While anxiety, stressful life events, and depression were negatively related to gambling symptom improvement, only recovery capital (i.e., internal and external positive resources utilised during recovery) and intrinsic spirituality were unique independent predictors, highlighting their beneficial role in the treatment and recovery process.								
Gehlenborg, Bucker, Berthold, Miegel, and Moritz (2021)	Germany	Convenience	Gamblers	25	Range: 18-70; M: 40.16; SD: 12.72	92%	Single-arm trial	1	To examine the feasibility, acceptance, and safety of a novel metacognitive training for individuals with gambling problems (Gambling-MCT).
	Main findings: (1) Significant improvements were observed in gambling symptom severity and cognitive distortions at post-assessment and an average of 4.16 (SD=2.84) training sessions were completed; (2) Despite recruitment challenges, overall treatment satisfaction and completion rates were high (72%) and there were no negative side effects in mental state after any of the eight modules.								
Granero, Valero-Solis, et al. (2020)	Spain	Clinical (gambling)	Gamblers	192	Range: 19-35; M: 29.7; SD: 4.1	NR	Chart review	2	To estimate the response trajectories of gambling severity during the six-month follow-up after a cognitive behavioural therapy (CBT) program in young adult patients and to identify the main variables associated with each trajectory.
	Main findings: (1) Three response trajectories across a six-month follow-up period were identified, including patients with severe (n=118; T1) or moderate-severe (n=62; T2) gambling disorder and good evolution to recovery and patients with severe gambling disorder and poor evolution to recovery (n=12; T3); (2) T3 revealed that predictors of the worst treatment outcomes included low education, socioeconomic status, and self-directedness and high gambling severity, global psychopathology, and harm avoidance, which suggests that patient phenotypes might impact intervention efficacy; (3) T2 displayed lower gambling severity, global psychopathology, novelty seeking, and harm avoidance and higher persistence, self-directedness, and cooperativeness, relative to T1; (4) Treatment dropout was 28.6%, with no differences in socio-demographics or clinical presentations between treatment completers and dropouts.								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
Gunstone, Gosschalk, Joyner, Diaconu, and Sheikh (2020)	UK	Online panel	General population	12161	Range: NR; M: NR; SD: NR	49%	Cross-sectional	4	To explore the potential impacts of the COVID- 19 pandemic and lockdown on gambling behaviour and gambling harm.
	Main findings: (1) Gamblers experiencing higher levels of gambling-related harm, Black, Asian, and Minority Ethnic gamblers, and younger gamblers (18-34-years-old) were more likely to have used a safer gambling tool (e.g., self-exclusion) during lockdown; (2) Black, Asian, and Minority Ethnic gamblers and female gamblers were more likely to have used books, leaflets, or other printed materials to help them to cut down their gambling; (3) Black, Asian, and Minority Ethnic gamblers showed higher demand for support from their employers.								
Gunstone and Gosschalk (2020c)	UK	Online panel	General population	12161	Range: NR; M: NR; SD: NR	49%	Cross-sectional	4,5	To explore the usage of, and demand for, treatment and support services among gamblers and those affected by another's gambling, with a specific focus on women.
	Main findings: (1) Women who had more severe gambling problems, younger age (18-24-years-old), Black, Asian, and Minority Ethnicity, middle-class status, responsibility for children in the household, and greater alcohol use were more likely to seek formal treatment services and/or informal supports; (2) While most female affected others did not seek support, they were more likely to utilise informal supports; (3) For female gamblers, barriers to treatment included perceptions of gambling as not harmful, stigma, and inaccessible or irrelevant/unsuitable treatment, and motivators for treatment included knowing that treatment was free, confidential, available via specific pathways, and easily accessible; (4) For female affected others, treatment barriers included perception of treatment as irrelevant/unsuitable and not recognising that gambling was a problem, and treatment motivators included wanting or needing ideas for coping with gambling and impacts to safety/wellbeing, relationships, finances, mental health, and other (e.g., risk of losing job).								
Gunstone and Gosschalk (2020a)	UK	Online panel	General population	12161	Range: NR; M: NR; SD: NR	49%	Cross-sectional	4,5	To explore the usage of, and demand for, treatment and support services among gamblers and those affected by another's gambling, with a focus on gamblers from Black, Asian and Minority Ethnic (BAME) communities.
	Main findings: (1) Those with more severe gambling problems or middle-class status were more likely to seek formal treatment services and/or informal supports; (2) Treatment barriers included thinking that gambling was not risky enough or that they only gamble small amounts or that treatment is irrelevant/unsuitable; (3) Treatment motivators included having an awareness of specific treatment pathways and knowing that treatment was free and confidential.								
Gunstone and Gosschalk (2020b)	UK	Online panel	General population	12161	Range: NR; M: NR; SD: NR	49%	Cross-sectional	1,4,5	To explore the usage of, and demand for, treatment and support services among gamblers and those affected by another's gambling.
	Main findings: (1) Gamblers reported that formal treatments were generally less helpful than informal support and treatment uptake was higher among those with more severe gambling risks, younger age, and Black, Asian, Minority Ethnicity; (2) For gamblers, key treatment barriers included a perception that gambling is not harmful or that treatment is not relevant/suitable, whereas treatment motivators included knowing support was easily accessible and available via specific pathways or close others had spoken to them about their gambling; (3) Almost half (45%) of affected others sought formal treatment								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
	or informal support for themselves or the gambler, with the greatest demand for support groups or mental health services, respectively; (4) Affected others reported that key treatment barriers included the gambler not realising the problem, a perception that treatment would not be helpful or effective, and stigma, whereas motivators included concerns for safety and wellbeing, not knowing how to manage the situation, and impacts on relationships, mental health, and finances.								
Gunstone, Gosschalk, Joyner, and Diaconu (2021)	UK	Online panel	General population	18879	Range: NR; M: NR; SD: NR	48%	Cross-sectional	1,4,5	To explore the usage of, and reported demand for, treatment and support services among gamblers and those affected by another's gambling and draw comparisons with a previous study to investigate the impact of the Coronavirus (COVID-19) pandemic on gambling behaviour, as well as wider issues relating to gambling treatment and support.
	Main findings: (1) 63% of problem gamblers, 18% of moderate-risk gamblers, and 4% of low-risk gamblers utilised gambling treatment, advice, or support in the past 12 months; (2) Of those who utilised treatment, 36% utilised remote services which they saw as better (44%) or equivalent (38%) to accessing face-to-face services due to increased privacy; though, overall treatment users tended to prefer informal supports over formal treatment; (3) Key barriers to treatment included a perception that gambling was not harmful or resulted in positive results and that treatment was not relevant/suitable, as well as stigma and denial, whereas motivators included knowing support was easy to access and available via specific pathways or close others speaking to them about their gambling; (4) Almost half of affected others (41%) sought formal or informal support, with treatment barriers identified as the gambler not realising the problem, perceiving treatment as unhelpful/ineffective, and stigma, and motivators identified as mental health problems, concerns for safety and wellbeing, and needing help on how to manage the situation.								
Hawker, Merkouris, Youssef, and Dowling (2021)	Australia	Convenience	Gamblers	36	Range: 35-49; M: NR; SD: NR	61%	Single-arm feasibility trial	1	To examine the acceptability, feasibility, and preliminary effectiveness of GamblingLess: Curb Your Urge, the first smartphone app–delivered EMI that aims to prevent gambling episodes by reducing craving intensity in people seeking help for gambling problems.
	Main findings: (1) The app was considered acceptable, as most participants (~60%) completed post-intervention and one-month follow-up evaluations, whereby completers indicated satisfaction and above average helpfulness of the intervention; (2) Feasibility was somewhat limited, however, by low compliance rates with real-time assessments (51%) and interventions (15%) administered throughout the trial; (3) Conversely, preliminary effectiveness data showed a ~70% reduction in the average number of gambling episodes and craving occurrences across the intervention period and medium-to-large reductions in mean gambling symptom severity, cravings, frequency, and expenditure at post-intervention and follow-up, with over a quarter of participants considered 'recovered or improved' by the end of the trial.								
Heinlein et al. (2021)	USA	Clinical (HIV/Primary Care)	Gamblers	15	Range: NR; M: 49.48; SD: 3.26	60%	Single-arm pilot trial	6	To evaluate the feasibility, acceptability and preliminary outcomes of a gambling specific Screening, Brief Intervention and Referral to Treatment (SBIRT) intervention in a medical setting.

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
	Main findings: (1) Participants reported that the intervention was helpful and easy to understand and clinicians delivering the intervention reported that it was efficient and easy to administer; (2) Relative to baseline, individuals who participated in the intervention displayed a decreased median number of days and money gambled at a one-month follow-up, with individuals who endorsed four or more diagnostic criteria for gambling displaying the greatest reductions (26 days vs. 21 days; $400 vs. $65).								
Ledgerwood et al. (2020)	Canada	Clinical (gambling)	Gamblers	125	Range: 24-85; M: 45.7; SD: 13.9	65%	Chart review	1,2,3	To identify factors associated with elevated cognitive distortions among problem gamblers entering residential treatment, examine changes in cognitive distortions through treatment, and explore the association between cognitive distortions and treatment outcomes.
	Main findings: (1) Gambling-related cognitive distortions were clinically and statistically significantly reduced at post-treatment, where older age and greater impulsivity/addition predicted greater overall change in cognitive distortions; (2) Treatment completion was high (90%); dropout was associated with male gender, younger age, higher impulsivity/addiction, and greater perceived control over gambling.								
Mallorqui-Bague et al. (2020)	Spain	Clinical (gambling)	Gamblers	245	Range: 18-77; M: 42.38; SD: 13.55	100%	Chart review	2	To compare impulsive traits and gambling-related distortions in strategic versus non-strategic gamblers and online versus offline gamblers; and to examine the longitudinal association between impulsivity/cognitive distortions and treatment retention and relapse.
	Main findings: Following 12-weekly CBT in a general hospital: (1) strategic gamblers had a higher lack of perseverance and gambling-related expectancies and illusion of control than non-strategic gamblers; (2) online gamblers had higher distortions than offline gamblers; (3) lack of perseverance predicted treatment dropout; and (4) negative urgency and distortions of inability to stop gambling and interpretative bias predicted number of relapses during treatment.								
McAfee et al. (2020)	USA	Universities	Gamblers	255	Range: NR; M: 22.21; SD: 4.09	62%	RCT	1,3	To compare the efficacy of personalized feedback-based interventions delivered via smartphone and text message (personalized feedback and follow-up targeted text messages; personalized feedback and follow-up educational information about gambling; no-intervention control).
	Main findings: (1) Neither intervention condition led to any direct or indirect effects on gambling abstinence, average wager amount, and gambling-related problems at a six-month follow-up compared to each other and compared to the control; (2) There was, however, a significant mediated effect on gambling-related problems at the six-month follow-up via gambling norms (i.e., participants in the intervention conditions reported less perceived gambling among other students) at the one-month follow-up.								
Melero Ventola, Yela,	Spain	Regional Association	Gamblers	33	Range: NR; M: 41.91;	100%	Repeated measures	1	To compare the effectiveness of a mindfulness-based cognitive therapy

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
Crego, and Cortes-Rodriguez (2020)		of Pathological Gamblers			SD: 11.67				(MBCT) intervention with a mutual-aid group intervention, the standard intervention provided in pathological gamblers' associations, in reducing gambling-related craving.
	Main findings: (1) There was no change in total cravings, but a decrease in craving intensity, following the mutual-aid intervention, compared to a significant, large increase in mindfulness and decrease in craving intensity, frequency, and urge following the mindfulness-based intervention; (2) The latter treatment gains were maintained at one-month, three-month, and six-month follow-ups, which the authors attributed to a high rate (84%) of continued, regular mindfulness practice, as well as high levels of satisfaction and perceived helpfulness of the intervention.								
Merkouris, Dowling, and Rodda (2020)	NA	NA	NA	NA	NA	NA	Systematic review & meta-analysis	1	(1) To identify the content and characteristics of the available psychosocial treatments for individuals affected by someone else's addiction (alcohol, illicit drugs, gambling and/or internet gaming). (2) To narratively synthesise the effectiveness of psychosocial treatments for affected others across addictions; and 3. To determine the effectiveness of psychosocial treatments for affected others across addictions and the durability of treatment effects, relative to passive control groups, using meta-analyses.
	# of included articles: k=40; Study design: pre-post, RCT or controlled trial study design; Participant type: individuals affected by someone else's alcohol use, substance use, gambling or internet gaming; Years covered: January 1989 to October 2019. Main findings: (1) The results demonstrated positive treatment outcomes for face-to-face treatments, relative to control conditions, for improving depressive symptomatology, affected other coping, addicted person treatment entry, and relationship discord; (2) Conversely, there were no significant differences between self-directed treatment and control conditions; though, few studies were included in these analyses; (3) Given a small number of included gambling studies (k=7), the broader addiction findings indicated that further gambling research is needed to evaluate the effectiveness of available affected-other treatments (Community Reinforcement Approach and Family Training; coping skills training; 5-step approach, Pressures to Change), as well as the development of treatments specifically designed for people affected by someone else's gambling.								
Merkouris, Hawker, Rodda, Youssef, and Dowling (2020)	Australia	Convenience	Gamblers, clinicians, researchers	29	Range: NR; M: NR; SD: NR	Gamblers: 40%; Clinicians: 44%; Researchers: 50%	Usability testing	1	To develop and test the usability of one of the first smartphone app-delivered ecological momentary interventions for gambling (GAMBLINGLESS: CURB YOUR URGE), with key Australian stakeholders.
	Main findings: (1) Respondents gave high quantitative and qualitative ratings of the intervention's helpfulness and usability, with all stakeholder groups indicating that they would recommend the app, as it could increase knowledge, attitudes, awareness, behaviour change, intention to change, and help-								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
	seeking for gambling cravings; (2) Areas of improvement prior to a real-world trial of the app were also identified, such as the intervention's interactivity and diversity of content.								
Milic, Lohan, Petch, Turner, and Casey (2021)	Australia	Clinical (gambling)	Gamblers	146	Range: NR; M: NR; SD: NR	75%	Repeated-measures	1,2	To investigate the effectiveness of motivational interviewing on the outcomes for help seeking problem gamblers when delivered by practitioners in routine practice at a community-based Gambling Help Service (GHS).
	Main findings: (1) Study retention was 55% at 18 months and over half of the participants reported satisfaction with the service; (2) Motivational interviewing was associated with significant, small improvements in problem gambling severity and psychological distress at both follow-ups; (3) Practitioner non-adherence to motivational interviewing (confront and persuade behaviours) predicted deterioration in problem gambling severity and psychological distress and lower client satisfaction.								
Nilsson, Magnusson, Carlbring, Andersson, and Hellner (2020)	Sweden	Convenience	Gamblers and affected others	136 couples	Gamblers: Range: NR; M(SD): 35.6(NR) Affected others: Range: NR; M(SD): 45.3(NR)	Gamblers: 82%; Affected others: 24%	RCT	1	To compare the efficacy of behavioural couples therapy (BCT) and cognitive behavioural therapy for both gamblers and concerned significant others.
	Main findings: (1) Concerned significant others did not receive treatment in the CBT condition. (2) Overall, gamblers in both conditions displayed similar improvements on gambling symptomatology, frequency, financial loss, and consequences, as well as alcohol use, depressive and anxious symptomatology, and relationship satisfaction; though, gamblers in behavioural couples therapy had slightly greater adherence to treatment and likelihood of commencing treatment; (3) There was also little difference in concerned significant other measures between conditions – those in behavioural couples therapy was ranked higher and led to slightly greater reductions in gambling consequences - which surprisingly suggested little benefit from their involvement in treatment.								
Oakes et al. (2020)	Australia	Clinical (gambling)	Gamblers, affected others, clinicians, researchers	19	Range: NR; M: NR; SD: NR	NR	Qualitative	1	To describe the development and piloting of the six-step brief intervention that help to identify the best way to support individuals to reduce distress and maximise further treatment-seeking.
	Main findings: (1) The intervention's six steps span identifying and measuring distress; normalising and reducing distress; optimising motivation for change via a teachable moment; fostering hope; re-measuring distress; and exploring treatment and support pathways; (2) Clinicians who piloted the intervention at an Australian gambling helpline from 2016-2019 reported positive feedback, as the intervention appeared to enable clients to meaningfully engage in seeking and obtaining help.								
Pettorruso et al. (2021)	NA	NA	NA	NA	NA	NA	Systematic Review	1	To determine the impact of different Non-Invasive Brain Stimulation (NIBS)

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
									interventions on gambling-related decision processes.
	# of included articles: k=27; Study design: Original articles (open label/double-blind trials, prospective/retrospective observational studies, case series, case reports); Participant type: GD patients or health subjects; Years covered: Up to June 1, 2020. Main findings: (1) Despite diverse protocols and parameters, most interventions targeted the dorsolateral prefrontal cortex, whereby stimulation (not inhibition) of this region appeared beneficial for contrasting poor gambling-related decisions; (2) More research is needed to investigate connectivity changes and laterality issues in this area.								
Pfund et al. (2021)	NA	NA	NA	NA	NA	NA	Systematic review & meta-analysis	1,2	To examine the overall prevalence of dropout from psychological treatments for problem gambling and gambling disorder and to examine how study, client, and treatment variables influenced dropout rates.
	# of included articles: k=24; Study design: No limit; Participant type: met diagnosis for problem gambling or gambling disorder according to an empirically validated assessment strategy; Years covered: Up to July 2020. Main findings: (1) A weighted dropout rate of 39.1% across 24 included studies (31 dropout rates) was identified; (2) Increases in the percentage of married participants was associated with lower dropout; (3) Subgroup analyses revealed that dropout rates were significantly higher in studies conducted in Sweden, among non-treatment-seeking samples, or when defining dropout as attendance of all sessions in a treatment protocol rather than a prespecified portion of sessions.								
Ribeiro, Afonso, and Morgado (2021)	NA	NA	NA	NA	NA	NA	Systematic Review	1	To synthesise the efficacy of various available non-pharmacological therapies for GD evaluated in randomized controlled trials.
	# of included articles: k=22; Study design: RCTs; Participant type: humans with a diagnostic of GD; Years covered: Up to February 29, 2020. Main findings: (1) There was evidence supporting a diverse range of psychotherapies; (2) Face-to-face and online CBT garnered the most evidence for improving gambling outcomes (k=7), followed by motivational interviewing and/or imaginal desensitisation (k=4), cognitive therapy (k=3), and single studies on exposure therapy, couples therapy, node-link mapping, and 12-step facilitated and personalised feedback interventions, as well as non-significant support for physical exercise.								
Ridley, Wiltshire, and Coleman (2020)	NA	NA	NA	NA	NA	NA	Audit	1	To review the features, models of treatment, and aims of apps marketed to assist people in addressing their gambling.
	Main findings: (1) Gambling intervention apps (n=42) were far outweighed by gambling or gaming apps on app stores; (2) Most intervention apps aimed for abstinence (81%) and included only one feature (69%), wherein abstinence time trackers were most common; (3) Less than a quarter of the apps (24%) utilised identifiable treatment models, wherein 12-step models were most common; (4) Overall quality varied substantially across the apps.								
Riley, Harris, Nye, Javidi-Hosseinabad, and Baigent (2021)	Australia	Clinical (gambling)	Gamblers	6	Range: 21-42; M: NR; SD: NR	100%	Case series	1	To describe the feasibility and preliminary effectiveness of cue exposure therapy (CET) to treat individuals presenting to a community-based PG therapy service

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
									with an online smartphone sports betting addiction.
	Main findings: (1) Following up to 10 weekly, one-hour manualised sessions, all participants completed an average of 8.33 sessions (SD=1.75) and reported improvements in gambling harm, urges, and cognitions, psychological distress, and functional impairment; (2) At a one-month follow-up, psychological distress, problem gambling, and functional impairment reduced below the clinical cut-off for at least five of the participants.								
Rosen, Weinstock, and Peter (2020)	USA	Convenience	Gamblers (ex-offenders)	126	Range: NR; M: 32.49; SD: 7.27	87%	RCT	1,5	(1) To examine gambling attitudes and problem awareness among ex-offenders. (2) To compare the efficacy of a brief online motivational intervention with a referral to gambling treatment to a control condition (referral only) for ex-offenders.
	Main findings: (1) The results at a 30-day follow-up revealed that both groups displayed increased negative attitudes toward gambling and decreased gambling frequency and money gambled, which suggested no added benefit of a brief intervention; (2) Overall, 44% of participants contacted the gambling referral provided; (3) The most frequently endorsed barriers to seeking treatment were the belief that treatment would be ineffective or that a gambling problem does not exist.								
Segawa et al. (2020)	NA	NA	NA	NA	NA	NA	Systematic Review	1	To present an overview of Virtual Reality (Head Mounted Devices) in the field of addiction medicine for craving assessment and treatment.
	# of included articles: k=27; Study design: RCTs, controlled trials, trails, case series. Participant type: Adolescent or adult humans with SUD or behavioural addiction. Years covered: Up to March 2019. Main findings: (1) Of the 27 articles identified, only two involved the use of virtual reality for craving assessment and treatment for gamblers; (2) One article (Giroux et al., 2013) found no change in craving and self-efficacy in 10 outpatient gamblers following a single 20-minute session of Virtual Exposure Therapy; (2) Conversely, one article comprising three studies (Bouchard et al., 2017) reported overall reductions in cravings and problem gambling symptoms in gamblers undergoing inpatient CBT alongside two to four 20-minute virtual exposure sessions, which were not significantly different from a control group completing comparable imaginal exposure.								
Shirk, Muquit, Deckro, Sweeney, and Kraus	USA	Clinical (mental health)	Gamblers (veterans)	3	Range: 46-57; M: 51.67; SD: 5.51	100%	Case series	1,5	To describe the application of a manualized mindfulness treatment used with U.S. veterans seeking outpatient treatment for GD at a Department of Veterans Affairs hospital.
	Main findings: (1) At post-treatment, the veterans reported reduced gambling frequency, craving frequency, and craving intensity, as well as improvements in craving self-efficacy, impulsivity, emotion dysregulation, and functioning; (2) Reported barriers to treatment included a lack of access to specialised support and perceived stigma, whereas motivation for treatment included wanting to obtain abstinence from gambling, skills to control gambling, improved relationships, reduced financial stress and increased freedom.								
van Minnen, Markus, and Blaauw (2020)	Netherlands	Clinical (gambling)	Gamblers	8	Range: 25-61; M: 46.5; SD: 11.30	63%	Multiple baseline	1	To investigate whether addiction-focused Eye movement desensitization and reprocessing (AF-EMDR) therapy reduced gambling urge and increased experienced self-control.

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
	Main findings: The results were mixed; while no adverse effects were found, participants' daily diary entries revealed spontaneous recovery in three participants during a 3-to-7-week non-treatment baseline phase, no treatment response in two participants, and treatment improvements in the remaining three participants.								
Wall et al. (2021)	Sweden	Clinical (gambling)	Gamblers	4655	Range: NR; M: NR; SD: NR	67%	Uncontrolled open trial	1	To evaluate the feasibility and module content of a brief online self-help program for concerned gamblers in the context of a gambling helpline.
	Main findings: (1) Initial program engagement was high, as 4655 people completed program registration, of which 92% engaged in at least some module content (a motivational balance task was the most popular and gambling expenditure log was the least popular) and 23% engaged in all four modules; (2) Gambling expenditure decreased when it was logged over a shorter period but increased when it was logged over a longer period; (3) Program dropout was high, however, with only 10% retention in the gambling log after 14 days.								

Footnotes:

Subtheme 1: Which treatments work; Subtheme 2: For whom treatment works; Subtheme 3: How and why treatments work; Subtheme 4: Professional help-seeking preferences; Subtheme 5: Motivators and barriers for seeking treatment; Subtheme 6: Effectiveness of Screening, Brief Intervention and Referral to Treatment (SBIRT)

Table of Included Studies Theme 4: Gambling among vulnerable groups

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
Adam et al. (2020)	Australia	NA	Mixed	Lived experience:12 Practitioner: 24 Agency: 15	Lived experience: Range: NR; M: 49 (female) 39 (male); SD: NR Practitioner: Range: NR; M: NR; SD: NR Agency: Range: NR; M: NR; SD: NR	Lived experience: 50% Practitioner: NR Agency: NR	Qualitative	3	To present a Culturally Responsive Framework to Address Gambling Related Harm (herein referred to as the Framework) based on the findings of participatory action research. The purpose of the Framework is to enhance the capacity of the multi-sectorial human service system to provide appropriate and effective responses at the systemic, organisational, professional, and individual levels.
	Main findings: The action research findings identified six effective ways of working with people from culturally and linguistically diverse backgrounds to address gambling related harm, being effective community engagement, accessibility in service, tailored and bespoke interventions, a grounding in								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
	evidence-based practice, specialist subject matter knowledge, community education, and initiatives that are peer led and inclusive of individuals with lived experience.								
Adebisi, Alabi, Arisukwu, and Asamu (2021)	Nigeria	General population (convenience)	Gamblers	30	Range: 15-29; M: NR; SD: NR	70%	Qualitative	2	To investigate how the dynamics of gambling in recent times have affected the biographies of youth within a relatively deprived socio-economic locality in Kwara State, Nigeria
	Main findings: Nigerian youth adopt three specific gambling types as a coping strategy in the face of a crisis-ridden socio-economic structure characterised by poverty, and unemployment. As such, gambling has become a normative activity experimented by the youth to survive the harsh economic conditions.								
Ahuja, Werner, Cunningham-Williams, and Bucholz (2021)	USA	General population (representative)	Youth	1349	Range: 10-19; M: 20.3; SD: 3.9	48	Longitudinal	3	Racial associations between gambling and suicidal behaviours among black and white adolescents and young adults
	Main findings: The current findings revealed that gambling initiation predicted suicide ideation among Black youth, while no significant association was found among White youth. This is of major public health concern, given the rising rates of suicide among Black youth, and the increased availability of gambling. The report did not find a link between gambling and suicide attempts. Culturally tailored interventions should be considered among schools, families, and clinicians/providers, to highlight the risk of adolescent gambling, particularly among Black youth.								
Bellringer, Pearson, and Iusitini (2021)	New Zealand	General population (convenience)	Youth	1063	Range: 9 and 14 years; M: NR; SD: NR	51%	Longitudinal	1	To determine if youth gang involvement is associated with problem gambling in New Zealand.
	Main findings: Gang involvement at age 9 years was significantly associated with gambling at age 14 years, with adjusted odds of 2.25 (95% CI = 1.16-4.37). Of confounders, having a mother with a partner and Cook Islands ethnicity appeared protective against gambling.								
Bitanihirwe and Ssewanyana (2021)	NA	NA	NA	NA	NA	NA	Systematic Review	1	To explore gambling patterns, attitudes and behaviours among youth in sub-Saharan Africa.
	# of included articles: k=13; Study design: NR; Participant type: adolescents and young people (10 to 35 years); Years covered: Up until July 2019. Main findings: Studies varied considerably ranging from neuropsychological and personality trait assessment to application of item response theory. The results suggest that the existing body of evidence pertaining to patterns of gambling-related harm among youth in SSA is weak. Studies found a variety of gambling activities and that sports betting represents the most common form of gambling activity. A range of motivations were observed and youth gambling is similar to that of European counterparts Gambling severity is mainly measured via engagement rather than standardised measures. There is a need for additional good quality studies focusing on gambling related behaviours and prevalence levels among the continent's youth. Findings emphasised the need for implementing social policies alongside effective public health interventions to tackle gambling addiction.								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
Botella-Guijarro, Lloret-Irles, Segura-Heras, Cabrera-Perona, and Moriano (2020)	Spain	Schools	Youth	1074	Range: 13-18; M: 15.1; SD: 1.01	45%	Longitudinal	1	To improve preventive interventions by understanding the predictors of gambling onset in adolescence.
	Main findings: Gambling onset and maintenance was associated with gender, age, sensation-seeking, risk perception, self-efficacy for not gambling, parents' attitude towards gambling, group pressure (friends), subjective norm, exposure to advertising, accessibility, normative perception, gambling in T1 and parents gambling behaviour. Gender, gambling in T1 and risk perception were significant in all three logistic adjusted regression models, with the fourth variable being sensation seeking, peer pressure (friends) and accessibility, respectively.								
Bramley, Norrie, and Manthorpe (2020)	UK	Migrants	Migrants	32	Range: NR; M: NR; SD: NR	Migrants: 75% Workers: NR	Qualitative	3	To explore support for UK migrants experiencing gambling-related harm.
	Main findings: Participants felt migration history may impact on their gambling participation, while recent migrants experience similar gambling-related harms to the UK general population, their experience of harms may be exacerbated or accelerated by socio-economic circumstances. Concerns surrounding trust, confidentiality, social interaction, integration and language proficiency were interwoven with barriers that migrants may encounter when engaging in help-seeking behaviour. Participants called for better evidence and understanding of the culturally specific and contextual harms that migrants may experience from their gambling. They advocated a stronger emphasis on prevention and the development of culturally competent gambling support services. Thus migrants are vulnerable to gambling-related harm; however, existing gambling support services may not meet their needs. More research is needed to investigate gambling-related harm from the perspectives of migrants and to improve the promotion, design, delivery and accessibility of gambling support services for this population.								
Ciccarelli, Nigro, D'Olimpio, Griffiths, and Cosenza (2021)	Italy	Schools	Youth	396	Range: 14-19; M: 17.22; SD: 1.03	31%	Cross-sectional	1	To investigate the relative contribution of mentalization, emotional dysregulation, cognitive distortions, and alcohol consumption among adolescent gamblers.
	Main findings: The results clearly indicated that, along with gambling-related cognitive distortions, uncertainty about mental states, and difficulties remaining in control of one's behaviour when experiencing negative emotions contributed significantly to problematic gambling among adolescents.								
Cox, Maltzahn, Lee, Whiteside, and Maclean (2021)	Australia	Gambling sites	Migrants	12	NR	NR	Qualitative	3	To understand how culture, class and gender shape the consumer practices of migrant women from Pacific Islands countries (Cook Islands and Tonga) who play bingo in regional Australia.
	Main findings: bingo is embedded in social relations that mitigate many of the ongoing financial problems and deeper existential anxieties for those in precarious economic circumstances.								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
Danioni, Ranieri, and Villani (2020)	Italy	Schools	Youth	237	Range: 14-19; M: 16.34; SD: 1.35	42%	Cross-sectional	1	To explore whether and which values may be protective or risk factors for gambling behaviours, this also considering gender differences.
	Main findings: Conservation and openness to change values seem not to influence gambling behaviours, self-transcendence and self enhancement values respectively negatively and positively predict gambling problems. More interestingly, self-transcendence values seem to work better as protective factors toward the severity of this risk behaviour especially for the male subsample.								
Day et al. (2020)	USA	General population (convenience)	General population	1164	Range: NR; Median: 43; IRQ: 25.6	48%	Cross-sectional	3	To evaluate whether the association between income and gambling disorder varies by ethnicity.
	Main findings: There was no evidence that race/ethnicity modified the association between income and gambling disorder. Income was associated with increased odds of gambling disorder, but only for those with low income (< $15,000). There was no evidence that the effect of income on gambling disorder varies by race/ethnicity.								
Dinc, Eksi, and Aricak (2020)	Turkey	Schools	Youth	790	Range: NR; M: 16.41; SD: 1.01	51%	Cross-sectional	1	To examine the relationship between online gambling addiction, temperament, and attachment styles in an adolescent sample in Istanbul, Turkey.
	Main findings: Online gambling addiction was predicted by sentimentality subscale of Reward Dependence, and it was related to Secure and Preoccupied attachment styles. Sentimentality subscale of Reward Dependence (RD) was found to be a significant predictor of online gambling addiction.								
Donati, Primi, Mazzarese, Sanson, and Leone (2020)	Italy	Schools	Youth	994	Range: NR; M: 16.57; SD: 1.62	64%	Cross-sectional	1	To explore the interaction between immigrant status (IS) and sensation seeking (SS) on adolescent problem-gambling severity.
	Main findings: Among immigrant adolescents, there were higher levels of problem-gambling severity and a higher distribution of at-risk and problem gamblers with respect to non-immigrant adolescents. Both IS and SS had significant direct effects on problem-gambling severity, with IS and higher levels of SS being predictors of greater severity. A moderation analysis – controlling for gender and age – showed that adolescents with high scores of SS were more prone to experience gambling problems if they were also immigrant.								
Donati, Weller, and Primi (2021)	Italy	Schools	Youth	296	Range: NR; M: 17.76; SD: 1.17	68%	Cross-sectional	1	To apply the risk-return model to explain gambling disorder symptoms in youth.
	Main findings: Risk-taking scores for the Gambling domain predicted adolescent gambling outcomes, relative to the other DOSPERT risk-domains (Ethical, Health/Safety, Recreational, Social). Greater gambling risk perceptions were associated with lower risk-taking scores, whereas greater perceived expected benefits were associated with higher risk-taking scores. Significant indirect effects were found between perceived risks and benefits and problem-gambling severity, mediated via Gambling risk-taking scores, though expected benefits demonstrated a stronger indirect effect.								
Dowling, Oldenhof, et al. (2021)	Australia	Clinical (gambling)	Gamblers	141	Range: 21-74; M: 39.6;	71%	Cross-sectional	4	To predict family violence (victimization and perpetration) in a sample of

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
					SD: 11.3				treatment-seeking gamblers by gambling indices
	Main findings: 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. These findings provide further support for routine screening in problem gambling and family violence services, particularly those who report gambling-related legal consequences.								
Emond et al. (2020)	UK	General population (representative)	General population	At 20 years: 2624 At 24 years: 1921	Range: 20 and 24 years; M: NR; SD: NR	39%	Longitudinal	2	To investigate stability of problem gambling between 20 and 24 years of age, and the antecedents and consequences of problem gambling at age 20 years.
	Main findings: The overall frequency of moderate- risk/problem gambling varied little between age 20 and 24 years, and scratch cards, online betting and gambling were the most frequent activities. Problem gamblers at age 20 years had a history of hyperactivity and conduct problems in adolescence, high sensation seeking, and an external locus of control. They were more likely to have mothers who had problems with gambling, reported less parental supervision, and higher social media usage. Moderate risk/problem gambling at age 20 years was associated with regular cigarette smoking, high levels of illicit drug use, and problematic use of alcohol at age 24 years. A significant minority of young adults (mainly males) showed problem gambling behaviours which appeared to be established by the age of 20 years and were associated with other potentially addictive behaviours.								
(Emond et al., 2021)	UK	General population (representative)	Young adults	2632	Range: NR; M: 28; SD: NR	29%	Longitudinal	2	To explore gambling during the early mitigation against COVID-19 (first lockdown).
	Main findings: Overall, gambling frequency reduced during lockdown for both males and females, but more males engaged in regular (weekly) gambling. Gambling activities became more restricted compared to previous reports, but online gambling was more frequent. Previous gambling behaviour predicted gambling frequency during lockdown. No associations were apparent between gambling frequency and measures of mental health and well-being. Heavy alcohol use was strongly linked with regular gambling during lockdown. Gamblers were more than twice as likely as non-gamblers to have experienced financial difficulties pre-COVID, but gambling frequency was not related to employment status during lockdown. Online gambling increased during lockdown, whilst offline gambling activities decreased in frequency. A small minority of regular weekly gamblers, who tended to be male and heavy users of alcohol, participated in a wide range of online and offline gambling activities.								
Estevez, Jauregui, Lopez-Gonzalez, et al. (2021)	Spain	General population (convenience) and clinical (gambling)	Youth	Total: 281 Community: 250 Clinical: 31	Community: Range: NR; M: 18.2; SD: 4.9 Clinical: Range: NR; M: 20.8; SD: 2.4	Community: 50%, Clinical: 90%	Cross-sectional	1	To examine the relationship between gambling severity and gambling-related cognitions with coping strategies and emotion regulation.
	Main findings: The participants from the clinical sample scored higher on gambling severity, emotion dysregulation, cognitive biases, and maladaptive coping strategies. In the community sample, cognitive biases mediated the relationship between sex and emotion dysregulation and disengagement.								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
	People with gambling disorder more often than controls use maladaptive emotion regulation strategies to manage negative emotional states. This perspective emphasises the need to focus on coping with emotions, as opposed to coping with problems, as the best approach to tackle gambling problems.								
Estevez, Jauregui, Macia, and Lopez-Gonzalez (2021)	Spain	Schools	Youth	Non-problem gamblers: 560 Problem gamblers: 54	Range: 12 and 21 years; Non-problem gamblers: M: 15.28; SD: 1.78 Problem gamblers: M: 16.12; SD: 1.76	Non-problem gamblers: 53% Problem gamblers: 62%	Cross-sectional	1	To explore the differences between problem gamblers and non-problem gamblers in gambling severity, spending, video gaming, alcohol and drugs use, attachment, and alexithymia, as well as the interaction among these variables.
	Main findings: Problem gamblers scored significantly higher in all substance and non-substance addictive behaviours and alexithymia; as well as significantly lower scores in mother and father attachment scales. Gambling was negatively associated with father and mother attachment, and positively associated to alexithymia. Finally, alexithymia was found to mediate between parental attachment and gambling, spending, videogame, drug and alcohol abuse, especially in the case of mother attachment. This study demonstrated that adolescent and young adult problem gamblers show higher comorbid addictions than non-problem gamblers, in the same way as higher levels of alexithymia and poorer father attachment.								
Estévez, Jauregui, Macía, and Martín-Pérez (2021)	Spain	Schools	Youth	206	Range: 12-18; M: 15.52; SD: 1.43	68%	Cross-sectional	1	To understand the relationship between alexithymia, difficulties in emotion regulation, and positive and negative affect in adolescents with and without risk of gambling problems.
	Main findings: The results obtained revealed higher scores in negative affect and pathological gambling in those at risk of gambling problems compared to others. Likewise, positive relationships between alexithymia, maladaptive emotion regulation strategies (MERS), and affect were found. Mediation analyses showed that difficulties in identifying feelings were indirectly related to greater use of dysfunctional ERS through their relationship with negative affect in at-risk gamblers.								
Farhat et al. (2021)	USA	Schools	Gamblers	2030	Range: 14-18; M: NR; SD: NR	68%	Cross-sectional	1	To examine reasons for gambling to identify adolescents who reported excitement-seeking motivation for gambling using a single question.
	Main findings: Gambling perceptions were more permissive and at-risk/problem gambling was more frequent among adolescents with excitement-seeking gambling versus non-excitement- seeking gambling. A weaker relationship between problem-gambling severity and moderate and heavy alcohol use was observed for excitement-seeking versus non-excitement- seeking gambling. Excitement-seeking gambling is associated with more permissive gambling-related attitudes and riskier gambling behaviours and may account for some variance in adolescent risk of heavy alcohol use. A single question may provide important information for identifying adolescents who are at elevated risk of problem gambling and associated negative outcomes, although the utility of the question in specific settings warrants direct examination, especially given the observed high prevalence of excitement seeking motivations for gambling.								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
Fiedor and Seidlová (2021)	Czech Republic	Migrants	Migrants	190	NR	NR	Cross-sectional	3	To explore gambling patterns among people from Vietnam and Ukraine living in the Czech Republic.
	Main findings: The analysis of immigrants' gambling behaviour shows that Ukrainians are more like the majority population. The Vietnamese immigrants differ from both the majority population and Ukrainians in terms of attitudes whilst gambling is for them is as common a problem as alcohol consumption, and an even more of a problem than smoking.								
Forrest and McHale (2021)	UK	General population (convenience)	Youth	1058	Range: 20 years; M: NR; SD: NR	NR	Longitudinal	1	To investigate the extent to which gambling problems at age 20 are linked to parental gambling behaviour during childhood, employing data from a longitudinal study.
	Main findings: Parental gambling participation at child age 6 was not a predictor of offspring problem gambling; but problem gambling by parents was a predictor of offspring problem gambling. However, this latter result was only found cross-gender (fathers' behaviour influencing daughters and mothers' behaviour influencing sons).								
Hahmann et al. (2021)	Canada	NA	NA	NA	NA	NA	Systematic Review	5	To explore the scope of the academic literature on the confluence of poverty and gambling problems.
	# of included articles: k=27; Study design: Studies of gambling problems/ disorder and an experiences of poverty/homelessness; Participant type: adults; Years covered: 2000-2019. Main findings: Gambling problems were associated with several poverty measures including employment/unemployment, housing instability, homelessness, low income, and neighbourhood disadvantage. The complex interplay of gambling problems with social and health issues emerged in qualitative papers. Relatively few studies explored the connection between poverty and gambling problems despite higher prevalence of gambling problems in this population. Those experiencing both concerns face myriad challenges necessitating surveillance and treatment within vulnerable populations. Further research should explore pathways to gambling problems and poverty and the associative nature and temporal sequencing of the two phenomena. Global awareness on the topic from a research and clinical/community service perspective is necessary.								
Hing et al. (2020)	Australia	General population (convenience) and service providers	Gamblers and affected others	Service provider: 39 Participants with lived experience of gambling related IPV: 72 (female victims); 5 (male perpetrators)	Service provider: Range: NR; M: NR; SD: NR Participants: Range: most commonly aged 30–39 years (33%) and 40–49 years (25%); M: NR; SD: NR	Service provider: 39%, Participant: 7%	Qualitative	4	To investigate the nature of the relationship between gambling and IPV against women by a male partner.

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
	Main findings: Where gendered drivers of violence against women are present, problem gambling exacerbates IPV against women, intensifying abusive behaviours due to the severe stresses that problem gambling places on individuals and relationships, and through organisational, systems and societal factors that reinforce problem gambling and gambling-related IPV.								
Hollen et al. (2020)	UK	General population (representative)	Young adults	Participants at age 17 years: 3566; Participants at age 20 years: 3940 Participants at age 24 years: 3841 at age 24	Range: 17-24; M:17.8; SD: 0.4 (age 17 group), M: 20.9, SD:0.5 (age 20 group) M:24.9, SD:0.6 (age 24 group)	Age 17 group: 42% Age 20 group: 39% Age 24 group: 35%	Longitudinal	2	To investigate gambling behaviour and to explore the antecedents of regular gambling in the 17–24-year age group.
	Main findings: Gambling on activities via the internet increased markedly between 17 and 24 years, especially among males. In the fully adjusted model, individual antecedents of regular gambling were being male, and having a low IQ, an external locus of control, and high sensation seeking scores. Parental gambling behaviour and maternal educational background were associated with regular gambling in both sexes. Regular gambling was associated with smoking cigarettes and frequent and harmful use of alcohol, but no associations with depression were found.								
Jauregui, Estevez, Macia, and Lopez-Gonzalez (2020)	Spain	Schools	Youth	1099	Range: 12-30; M: 15.50; SD: 2.17	49%	Cross-sectional	1	To examine the association between gambling disorder, comorbid addictive disorders (i.e., alcohol, drugs, spending, and videogames), positive and affective mood, and gambling motives in a community sample.
	Main findings: Enhancement, social, and coping motives are greater among problem gamblers and at-risk gamblers as compared to non-problem gamblers. Problem gamblers scored higher in gambling and comorbid disorders than at-risk gamblers, and also higher in gambling motives and negative mood when compared to non-problem gamblers. Likewise, gambling severity was significantly associated to gambling motives, negative mood, and other addictive disorders. Finally, enhancement motives were predictive of gambling, alcohol, drugs, and spending while controlling for the effect of age, sex, and positive and negative mood.								
W. Kim and Kim (2020)	South Korea	Migrants	Migrants	20	Range: NR; M: 73; SD: 7.11	50%	Qualitative	3	To explore gambling behaviours and shared beliefs about gambling among older Korean immigrants residing in New York City.
	Main findings: Overall, older Korean immigrants have retained their cultural beliefs about gambling, even as they have embraced the legalized gambling environment and changed social norms of the U.S. However, they have trouble reconciling the differences between their beliefs, behaviours, values, and newly acquired norms. Findings point to a need for healthy and affordable leisure pursuits, and for culturally appropriate intervention programs to help problem gamblers.								
S. M. King and Whelan (2020)	USA	Universities	Students	513	Range: NR; M: 19.65; SD: 1.93;	38%	Cross-sectional	2	To examine gambling and alcohol problems during the college years:

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
									personality, physical and emotional health and gambling beliefs.
	Main findings: Students with alcohol, gambling or co-occurring problem groups were compared to students without alcohol or gambling problems. All three groups with problems had higher scores on gamblers' beliefs of illusion of control compared to the group with no problems. Those with co-occurring problems had higher scores on illusion of control beliefs than those with alcohol problems only. Those with co-occurring problems had higher scores on luck/perseverance beliefs than other groups. Those with alcohol problems had significantly poorer mental health outcomes than those without alcohol or gambling problems. Individuals with gambling problems or alcohol problems had significantly poorer self-rated overall physical health.								
A. King, Wong-Padoongpatt, Barrita, Phung, and Tong (2020)	USA	Online panel	Young adults	263	Range: 18-25; M: 22.79; SD: 2.0	49%	Cross-sectional	2	To examine the potential comorbidity between internet gaming disorder (IGD) and gambling disorder (GD) in emerging adults, as well as explore if problematic engagement in gaming and gambling may be explained by recent trends in video game microtransactions (e.g., loot boxes) and risk-taking behaviours.
	Main findings: Compared to non-gamers, problematic gamers were 6.45 times more likely to problem gamble. Compared to non-gamblers, problem gamblers were 5.62 times more likely to problem game. Microtransactions were the major mechanism for the relationship between IGD and GD. Participants with higher severity levels of either disorder demonstrated a greater likelihood of purchasing microtransactions, in addition to displaying significantly less aversion towards several domains of risk-taking. These findings suggest that emerging adults with probable IGD or GD may share common risk factors and patterns of behaviour that transdiagnostic treatment approaches may better serve than syndrome-specific models.								
Li, O'Brien, Zhu, and Chen (2021)	China	Schools	Youth	16254	Range: NR; M: 15.89; SD: 0.99	52%	Cross-sectional	4	To examine specific mental and behavioural health outcomes of family violence exposure including trauma symptoms and addictive behaviours using a nationally representative sample of adolescents in China
	Main findings: More than two-thirds of the sample reported having been exposed to child abuse or IPV at home. Adolescents who were exposed to child abuse and/or IPV were significantly more likely to misuse substances, engage in gambling activities and exhibited more trauma symptoms than their non-exposed peers. A multivariate path analysis revealed that child abuse had an indirect effect on severity of trauma symptoms through problem drinking, cigarette smoking, and gambling behaviour. Witnessing IPV between parents had an indirect effect on trauma symptoms through problem drinking and cigarette smoking. An alternative pathway model suggested that child abuse and witnessing IPV between parents had indirect effects on a variety of substance misuse and gambling behaviour through PTSD.								
Luo (2020)	Canada	Migrants	Migrants	Gamblers: 18 Gambling Service providers: 4	Range: NR; M: 67.2; SD: 5.2	Gamblers: 44%	Qualitative	3	To explore gambling motives, behaviour, and help-seeking patterns in older Filipino-Canadians through a life-course perspective.

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
	Main findings: This study reveals that older Filipino gamblers' conceptualisation of gambling is greatly influenced by their culture of origin, their life trajectories, and their loved ones. Controlled gamblers hold positive to neutral views toward gambling, while problem gamblers generally hold negative views. Visiting casinos meets needs for active leisure activities for some. The study provides suggestions for social workers on working with older gamblers with minority cultural backgrounds.								
Luo (2021)	Canada	General population (convenience)	Ethnicity	15	Range: 61-84; M: 72.1; SD: 8.2	27%	Qualitative	3	To depict a collective picture of older Chinese gamblers in Canada
	Main findings: Older Chinese adults' gambling is discussed through the five life course perspective principles. Trauma has played a role in this group's lifelong development of gambling behaviour. Human agency, historical time and place and linked lives interacted to contribute to the establishment of gambling behaviour in later life that characterized as parallel play where older Chinese gamblers played in solitary rather than interacting with others.								
Marchica, Richard, Mills, Ivoska, and Derevensky (2021)	UK	Schools	Gamblers	1348	Range: NR; M: 14.67; SD: 1.73	64%	Cross-sectional	1	To examine the relation between esports betting, problem gambling (PG) and problem video gaming (PVG), and both externalizing and internalizing problems among adolescents while accounting for adolescents' video gaming intensity and engagement in other gambling activities.
	Main findings: Approximately 20% (n = 263) of the included sample had bet on esports during the past year. Esports betting was positively correlated with other forms of gambling, both PG and PVG, and externalizing behaviours. Mediation analyses revealed esports betting was associated to both internalizing and externalizing problems through PVG but not PG. Esports betting may be particularly appealing to adolescents who are enthusiastic video gamers.								
Mestre-Bach et al. (2021)	Spain	Clinical (gamblers)	Gamblers	808	Range: 18-30; M: 25.7; SD: 3.4	98%	Cross-sectional	2	To compare sociodemographic, clinical, personality and psychopathological features among young adults with gambling disorder (GD) with and without a history of illegal behaviours.
	Main findings: Of the total sample, 291 patients (36.0%) had committed GD-related offences. Illegal acts were related to younger age and unemployment status. Greater levels of psychopathology, as well as earlier GD onset, longer GD duration and greater GD severity were also associated with the presence of criminal behaviours. Differences in personality traits were also found between these two groups. The GD group with a history of illegal acts showed dysfunctional personality traits and higher levels of psychopathology. Specific GD treatments and harm reduction interventions should be designed for these patients.								
Mills, Marchica, Keough, and Derevensky (2020)	USA	Universities, online panel & general population (convenience)	Young adults	1621	Range: 18-27; M: 20.55; SD: 2.70	45%	Cross-sectional	2	To explore differences in substance use among emerging adults at-risk for problem gambling, and/or problem video gaming.

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
	Main findings: Results revealed that 6.1% and 22.7% of emerging adults were at-risk for PG or PVG, respectively. Those at at-risk for either PG or PVG had used substances more frequently than those who were either non-problematic or at low-risk. A small subset of participants (2.2%) were at-risk for both PG and PVG and were the most likely to report using cigarettes, marijuana, and other drugs frequently, even after accounting for the effects of age, gender, race, and gambling and video gaming frequency. As such, exhibiting a risk for both PG and PVG places individuals at greater risk for substance use.								
Oksanen et al. (2021) a	Finland	Online panel	Youth	Finland: 1200 US: 1212 South Korea: 1192 Spain: 1212	Range: 15-25; M: 21.29; SD: 2.85 (Finland), M: 20.05, SD: 3.19 (US); M: 20.61, SD3.24 (South Korea) M: 20.07; SD: 3.16 (Spain)	Finland: 50% US: 50% South Korea: 50% Spain: 51%	Cross-sectional	1	To analyse how different social ecological spheres explain problem gambling.
	Main findings: Regression models found, for all countries, variations in problem gambling were best explained by the organizational sphere measures (26%) when compared to the intrapersonal (11%), interpersonal (5%), and societal (3%) spheres. In the full model, the organizational sphere measures had strong associations with problem gambling including consumer debt, online gambling community participation, online casino participation, and exposure to online pop-up advertisements. Problem gambling was also associated with conformity to group norms in the interpersonal sphere, and male gender and impulsivity in the intrapersonal sphere. Within the final model, gambling community participation had the strongest association with problem gambling. The online context plays a major role in problem gambling behaviour. The social ecological model is a useful tool for tackling problem gambling and developing preventative measures.								
Pace, D'Urso, Ruggieri, Schimmenti, and Passanisi (2021)	Italy	Venues	Gamblers	273	Range: 15-19; M: 18.04; SD: 2.10	100%	Cross-sectional	1	To explore the unique and common role that some cognitive, personality and relational characteristics play in male adolescents' regular gambling behaviour.
	Main findings: The relationship between narcissistic rivalry and gambling was mediated by hyper-competitiveness and avoidant coping strategy. These findings suggest that narcissistic features and maladaptive coping strategies might be involved in the development of disordered gambling in youth, supporting a compensatory model of this addictive behaviour and suggesting preventative actions that take into account the psychological vulnerabilities of adolescents and young adults.								
Paleologou et al. (2021)	Greece	Schools	Youth	339	Range: 53.7% were 16 years old and 46.3%	42%	Cross-sectional	1	To explore adolescents' gambling involvement in Athens region and also to identify the socio-economic

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
					were 17-19 year old; M: NR; SD: NR				characteristics of adolescents who have engaged into gambling activities.
	Main findings: Adolescents showing symptoms of gambling problems were more likely to be boys, to have been born overseas and have low school grades, be in households experiencing poverty-related issues (eg lack of adequate food). These findings are congruent with the literature suggesting that youth living under poverty often resort to gambling. Findings point to adverse effects of the financial crisis on the development of problem gambling in adolescents within Greek society. It was suggested problem gambling may have developed in response to the ubiquitous insecurity characterizing the Greek society during this rough time period.								
Passanisi, D'Urso, Schimmenti, Ruggieri, and Pace (2020)	Italy	Venues	Gamblers	273	Range: 15-19; M: 18.04; SD: 2.10	100%	Cross-sectional	1	To explore the cognitive and personality characteristics of male adolescent gamblers.
	Main findings: Pathological gamblers reported higher levels of avoidant coping strategies than occasional gamblers. They also scored higher on hyper competitiveness than both occasional and problem gamblers. Further, problem gamblers scored higher than occasional gamblers on the complexity domain of creative personality. Finally, poor perceived social self-efficacy, higher levels of avoidant coping, and hyper competitiveness predicted pathological gambling.								
Pisarska and Ostaszewski (2020)	Poland	Schools	Youth	511	Range: 17-18; M: NR; SD: NR	58%	Longitudinal	1	To identify psychosocial and behavioural factors associated with gambling involvement among 16- to 18-year-old adolescents.
	Main findings: About 50% of students had been involved in some form of gambling at least once in their lifetime. The most prevalent forms of gambling included lottery games, scratch cards, card games and sports betting. Approximately 34% of adolescents had symptoms of increased gambling involvement. Generalised linear model analysis showed that male gender, wave 1 gambling, sensation seeking, delinquency and cyberbullying were the risk factors. Positive relationships with parents and meaningful activities were protective factors against gambling involvement.								
Rockloff et al. (2021)	Australia	Online panel	Youth	1954	Range: 12-24; M: NR; SD: NR	39%	Cross-sectional	1	To explore the use of loot boxes and gambling problems and harm.
	Main findings: Buying and selling loot boxes was associated with higher 12-month gambling frequency and gambling problems in young adults, aged 18–24. Young adults who bought loot boxes also had more gambling-related harms. Young women, aged 18–24, who opened, bought and/or sold loot boxes spent more money in the last 12 months on gambling. In adolescents, aged 12–17, buying loot boxes was similarly associated with gambling problems. Furthermore, adolescent girls who bought and/or sold loot boxes viewed gambling more positively than other girls. There was no evidence, however, that longer-term experience in opening or purchasing loot boxes, a differentiating feature of the survey, is associated with current gambling problems. This suggests that loot boxes may be attractive to people who are already predisposed to engage in other gambling, and females who use loot boxes may have unique vulnerabilities to gambling problems that could be explored in future research.								
Rockloff et al. (2020)	Australia	Online panel	Youth	Total: 1954	Range: 12-24; M:15.04,	Youth: 47%	Cross-sectional	1	To explore the associations between early exposure to gambling via loot boxes, attitudes and intentions

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
				Youth: 919 Young adults: 1035	SD: 1.66 (youth), M: 20.73, SD: 2.0 (young adults)	Young adults: 32%			regarding gambling and subsequent gambling and harm.
	Main findings: Almost all respondents played at least one video game with loot boxes within the last 12 months (93.2%). About a third (32.9%) of the survey respondents who played games with loot boxes within the last 12 months had also purchased a loot box, and their median monthly expenditure was $50 for adolescents and $72 for young adults. Compared to other purchasers, young adults who more recently first purchased loot boxes were more likely to have gambling problems. Conversely, there was no evidence that earlier experiences with loot boxes predict later gambling problems. Both adolescents and young adults who had either opened, bought or sold loot boxes within the last 12 months were also more likely to have: 1) gambled in the last 12 months (young adults), 2) gambled more frequently (young adults), 3) spent more money gambling (young adults), 4) suffered more gambling problems (adolescents and young adults), 5) suffered more gambling-related harm (young adults), and 6) endorsed more positive attitudes towards gambling (adolescents and young adults).								
Russell et al. (2020)	Australia	Online panel	Youth	2004	Range: 18-29 years; M: 23.65; SD: 3.55	37%	Cross-sectional	1	To explore how the formative gambling experiences of young adults (18-24) in New South Wales are different from the experiences of an older cohort (25-29) and what association can be made between early experiences.
	Main findings: The younger cohort (18-24) was more likely to have taken part in emerging forms of gambling and simulated gambling, while the older cohort (25-29) were more likely to gamble on traditional forms. The findings from this study reflect the changing landscape of gambling where newer forms of gambling and simulated gambling have recently emerged alongside the continued availability of traditional forms of gambling. This emergence provides the potential for substitution of traditional forms for newer forms amongst young adults who grew up with these emerging activities.								
Saunders and Doyle (2021)	NA	NA	NA	NA	NA	NA	Systematic Review	3	To identify broad key principles which underpin appropriate problem gambling interventions within the literature, both theoretical and empirical, relating to the indigenous communities of Canada, Australia, New Zealand, and U.S.A. (CANZUS).
	# of included articles: k=43; Study design: Studies of indigenous populations within CANZUS; Participant type: NR; Years covered: 2005-2020 Main findings: Despite the relative dearth of empirical evidence within this field, approaches to problem gambling intervention within indigenous populations must be culturally-centred and underpinned by a public health framework that considers the broad socio-politico-cultural context of the whole community. The importance of community-control, collaboration, community capacity building, workforce competence, a holistic approach, and gambling regulation cannot be overstated. The available literature focusses on an alternative approach to addressing problem gambling in indigenous communities, with findings highlighting key indigenist principles within a context-based method of engagement and intervention, including addressing the social, political, and cultural determinants of problem gambling at a community-level								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - theme	Study aims
Savolainen et al. (2021) a	Finland	Online panel	Young adults	Total: 4816 Finland: 1200 US: 1212 South Korea: 1192 Spain: 1212	Range: 15-25; M: 21.29; SD: 2.85 (Finland), M: 20.05, SD: 3.19 (US); M: 20.61; SD3.24 (South Korea) M: 20.07; SD: 3.16 (Spain)	50%	RCT	2	To examine if perceived gambling norms about gambling content in online interaction is associated with youth problem gambling.
	Main findings: A vignette experiment was used with half of the participants assigned to an in-group condition. Participants saw simulated gambling-themed social media messages with manipulated majority reactions. Norm conformity online was assessed using a within-person calculation. Norm conformity online was associated with youth problem gambling in all countries. In South Korea, this association was moderated by in-group norm source. The results indicate that young people who engage in problematic gambling may be more susceptible to conforming to perceived gambling norms online, but cultural differences exist. Intervention strategies should utilize educative online programs providing young problem gamblers accurate information about gambling.								
Savolainen et al. (2020) a	Finland	Online panel	Youth	Total: 4816 Finland: 1200 US: 1212 South Korea: 1192 Spain: 1212	Range: 15-25; M: 21.29; SD: 2.85 (Finland), M: 20.05, SD: 3.19 (US); M: 20.61; SD3.24 (South Korea) M: 20.07; SD: 3.16 (Spain)	Finland: 50% US: 50% South Korea: 50% Spain: 51%	Cross-sectional	1	To examine if belonging to online communities and social media identity bubbles predict youth problem gambling.
	Main findings: Strong sense of belonging to an online community was associated with higher problem gambling, but the association was observed mainly among those young individuals who were also involved in social media identity bubbles. For those youths who did not indicate identity bubble involvement, online relationships appeared to function as those offline.								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
Schulte et al. (2021)	Germany	Schools	Migrants	268	Range: 16-30; M: 21; SD: 2.6	87%	Longitudinal	3	To explore the role of migration background and cognitive distortions in the trajectories of gambling problems.
	Main findings: No differences of cognitive distortions with respect to migration background were found. In a GEE analysis, migration background and the believe in luck and perseverance were significantly associated with an increase of fulfilled DSM-5 criteria for Gambling Disorder over time. Findings validate the role of gambling-related cognitive distortions in this high-risk population and call for early prevention programs in the form of cognitive modification trainings specifically targeting the believe in luck and perseverance. Low-threshold prevention programs could be implemented in schools as they already exist for the prevention of alcohol abuse.								
J. Spångberg and J. Svensson (2020)	Sweden	Schools	Youth	81229 (30 countries in analysis)	Range: 15-16; M: NR; SD: NR	49%	Cross-sectional	1	To explore the associations between youth unemployment and youth engagement in gambling forms that have age limits, namely, slots, sports betting, and cards, both online and offline.
	Main findings: Underage gambling was associated with a higher degree of adolescent unemployment implying that a broad public health framework is needed in the prevention of problem gambling.								
J. Spångberg and Johan Svensson (2020)	Sweden	Schools	Youth	13172	Range: 15-16 M: NR; SD: NR	NR	Cross-sectional	1	To compare the prevalence of different gambling types as well as problem gambling in the Nordic countries, examining gambling, leisure activities, school truancy, parental relations and consumption of alcohol and other substances as covariates for problem gambling.
	Main findings: Cross-country differences were found in gambling and problem gambling, as well as differences in covariates for problem gambling. Sweden had the lowest rate of problem gambling. No significant difference was found between Denmark and Finland. Excessive gaming, inhalants, slots, betting and online gambling were positively associated with problem gambling, while parental monitoring and parental caring had a negative association. The relevance of the covariates varied across countries. Results indicate that although gambling regulation and its implementation have an important impact on gambling behaviour, we need more research on social, economic and cultural factors and how youth understand and interact with them. Contexts and regulations in other related fields should inform gambling research, policies and interventions.								
Spychala et al. (2021)	UK	General population (convenience)	Young adults	4729	Range: 17, 20 and 24 years of age M: NR; SD: NR	NR	Longitudinal	1	To examine associations between DG and polygenic scores (PSs) for Big 5 traits to measure the shared genetic underpinnings of Big 5 personality traits and DG.
	Main findings: Polygenic contributions to low agreeableness and high neuroticism predict two measures of disordered gambling (problem gambling severity index and life-time assessment of DSM-IV pathological gambling symptoms). Polygenic scores for neuroticism interact with age to suggest that the positive association becomes stronger from adolescence through young adulthood.								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
St Quinton (2021b)	UK	Universities	Students	250	Range: NR; M: 19.20; SD: 2.77	45%	Cross-sectional	2	To examine the relationship between Theory of Planned Behaviour constructs, past behaviour, habit, and future behaviour relating to students' participation in gambling.
	Main findings: Results showed attitude and perceived behavioural control (PBC) predicted intention, and intention and PBC predicted behaviour. The inclusion of past behaviour and habit attenuated the effects of attitude and PBC on intention and rendered the impact of intention on behaviour non-significant. The relationship between past behaviour and future behaviour was mediated by habit and PBC. Interventions should focus on attitude and PBC to attend to gambling intentions in addition to automatic processes to attend to student gambling behaviour.								
St Quinton (2021a)	UK	Universities	Students	473	Range: NR; M: 19.45; SD: 1.95	56%	Cross-sectional	2	To understand the key psychological factors underlying students' mobile gambling.
	Main findings: Attitude (affective and instrumental) and injunctive norm significantly predicted intention, and intention and autonomy significantly predicted behaviour. A number of key beliefs were identified including "Bonus offers and promotions" and "Access and availability of apps". Findings provide important information regarding the psychology underlying students' mobile gambling behaviour. Interventions could target the identified key beliefs to change the behaviour.								
Stark, Reynolds, et al. (2021)	Canada	General population (convenience)	Youth and parents	Total: 2651 Adolescents: 678 Young adults: 973 Parents: 1000	Range: Most adolescents were 16–17 years (42.4%) Most young adults were 21–24 years (57.9%) Most parents were 35–54 years (77.1%) M: NR; SD: NR	Adolescents 53%, Young adults 50%, Parents 36%	Cross-sectional	1	To improve our knowledge of gambling and gaming behaviours, as well as their convergence, by examining young people aged 8 to 24 and parents of children 8 to 17 years in Ontario.
	Main findings: Playing video games for money and social casino games were associated with a higher level of gambling problems among adolescents, young adults, and parents. Further, parent reports of their own and their child's gambling, social casino play, and gambling concerns were related. Thus, playing games that combine gambling and gaming was associated with increased risk across youth age groups. Parents who reported gambling, social casino play, and gambling concerns also tended to report these behaviours among and concerns for their children.								
Stark, Wardle, and Burdett (2021)	UK	General population (representative)	Young adults	3454	Range: 16-24; M: NR; SD: NR	45%	Longitudinal	1	To examine whether lottery and scratchcard participation is related to gambling problems among 16-24 year

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
									olds in Great Britain and whether general and mental health and gambling behaviours explain this relationship
	Main findings: There is a significant association between scratch card play and gambling problems. The association somewhat attenuated but remained significant after taking into account wellbeing, mental health disorders, general health, and engagement in other gambling activities. Findings also showed that gambling problems are further predicted by age (20-24 years), gender (male), lower wellbeing, and playing any other gambling games.								
Tani, Ponti, and Ghinassi (2020)	Italy	Schools	Youth	363	Range: NR; M: 16.35; SD: 1.36	64%	Cross-sectional	1	To examine the relationship between sensation seeking and gambling behaviour in adolescence.
	Main findings: Sensation seeking was associated with gambling severity, but this relationship was significant when externalizing problems were high and medium. On the contrary, when externalizing problems were low, the relationship between sensation seeking and gambling severity was not significant. Overall, sensation seeking in adolescence can favour the implementation of risk behaviours, such as gambling, but only in association with the presence of externalizing problems								
Tani, Ponti, and Ghinassi (2021)	Italy	Schools	Youth	1255	Range: 13-19; M: 16.06; SD: 1.47	59%	Cross-sectional	1	To explore the prevalence and frequency of gambling behaviours, the types of bets most frequently chosen, the amount of money spent on gambling, and the more frequent problem gambling behaviours, taking into account the type of gambler (regular and non-regular), gender, and age.
	Main findings: 70.8% of adolescents had gambled at least once in the previous year, with more than 68% of minors declaring that they had gambled. Among gamblers, 24% were regular gamblers and this group spent more money, had more gambling-related problems, and chose games more at risk for developing gambling addiction than the non-regular gamblers. Results also showed that males gambled more, more frequently, spent more, and presented more gambling-related problems than females. Adolescents of age gambled more on some games that involved going to places to bet than minors but no differences between minors and of-age adolescents emerged on the gambling regularity or expenditure. Gender and age differences emerged in the non-regular group, but not in the regular-gambling group.								
Terrone et al. (2021)	Italy	Schools	Students	178	Range: 16-22; M: 17.5; SD: 0.82	42%	Cross-sectional	1	To analyse a hypothesized mediation model exploring both the direct and indirect effects of insecure attachment on gambling disorder by investigating the role of the developmental perspective, theory of mind (friend) and adaptive response in that relationship.
	Main findings: The results showed a significant association between insecure attachment and gambling disorder and a significant chained mediation model in which insecure attachment negatively influenced the developmental perspective, which affected the theory of mind toward one's own best friend. These results highlighted a significant role of insecure attachment in predicting the symptomatic expression of gambling among adolescents, specifically								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
	impacting the development perspective, theory of mind toward one's best friend and adaptive response to stress, which were linked to each other by a sequential influence.								
Thomas et al. (2021)	Australia	General population (convenience)	Youth and young adults	45	Range: adolescent (18–24 years old) and young adult women (25–34 years old); M: NR; SD: NR	0%	Qualitative	2	To explore the range of key determinants that may shape the gambling beliefs and behaviours of older adolescent and young adult women (predominantly young women who demonstrated low and moderate risk levels of gambling).
	There are clear strategies that have been used by gambling and other harmful industries to appeal to women. Further research is needed to map and monitor whether similar strategies are being used to promote a range of different types of gambling products or gambling environments; and, ultimately, how these may impact on young women's gambling behaviours. A complex mix of individual, socio-cultural and commercial factors may be influencing young women's engagement in gambling. Clear and targeted harm prevention strategies, including public education campaigns, should be developed by public health practitioners, which specifically seek to appeal to young women. These campaigns could specifically target and seek to engage young women in a discussion about gambling products and the causes and consequences of gambling-related harm.								
Torrado et al. (2020)	Portugal	Universities	Students	117	Range: NR; M: 20.6; SD: 3.9	29%	Cross-sectional	2	To explore emotional dysregulation features and problem gambling in university students
	Main findings: The prevalence of gambling problems in this sample is modest (n=15 with any symptoms), although they were associated with negative urgency and sensation-seeking, as well as with depression symptoms. Multiple correspondence analysis, a particular multivariate model associating gambling problems with sociodemographic and psychological variables, allowed identifying different profiles of individuals. Trace and state emotional dysregulation features are selectively associated with distinctive gambling patterns. Results may address new findings in terms of morbidity, risk factors and the design of future preventive strategies among such individuals.								
Vandenberg et al. (2021), stakeholder interviews	Australia	General population (convenience) and service providers	Primary care and homeless service delivery	48	Range: NR; M: NR; SD: NR	27%	Qualitative	5	Undertake an empirical investigation of gambling and homelessness among older people (aged 50+ years) in Victoria, Australia.
	Main findings: Overall, participants believed that gambling and homelessness among older people is often linked, but the relationship is complex. Found two substantively different routes through which gambling and homelessness are linked (Themes 1 and 2) and identified a range of key contributing factors (Theme 3), as well as important ways of responding to gambling and homelessness (Theme 4).								
Vandenberg et al., (2020) systematic review	NA	NA	NA	NA	NA	NA	Systematic Review	5	To review the existing research literature on gambling and homelessness.

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
	# of included articles: k=57; Study design: Studies on gambling and homelessness; Participant type: NR; Years covered: Up to October 2018. Main findings: A large proportion of homeless populations do not gamble, but those who do gamble are often more likely to be harmful gamblers. The prevalence of harmful gambling among homeless populations is often higher than it is in the general community, and this is a consistent finding across multiple countries. The direction of the relationship between gambling and homelessness has not been rigorously investigated and, hence, remains an open question. A range of multi-level factors appears to contribute to the relationship, including individual factors (e.g. mental illness, substance use, trauma), interpersonal factors (e.g. relationship breakdown), community factors (e.g. availability of gambling), and broader structural factors (e.g. poverty).								
Vuorinen et al. (2021) a	Finland	Online panel	young adults	4816	Range: 15-25; M: 21.29; SD: 2.85 (Finland), M: 20.05, SD: 3.19 (US); M: 20.61; SD3.24 (South Korea) M: 20.07; SD: 3.16 (Spain)	Finland: 50% US: 50% South Korea: 50% Spain: 51%	Cross-sectional	2	Examine the role of psychological distress in diverse and non-clinical samples.
	Main findings: Loneliness and low sense of mastery were associated indirectly with excessive gambling via psychological distress in all country samples. Low sense of mastery was also directly associated with excessive gambling. There was a direct association between loneliness and excessive gambling in samples from South Korea and Spain.								
Wang, Won, and Jeon (2021)	USA	Universities	Young adults	334	Range: NR; M: 21; SD: 2.37	68%	Cross-sectional	2	To identify influences on college students' behavioural intention and behaviour towards sports gambling using the theory of planned behaviour (TPB)
	Main findings: Attitude was the most critical determinant of college students' sports gambling intentions, followed by the subjective norms, while both behavioural intention and perceived behavioural control were significant predictors of sports gambling behaviour. The study also found some meaningful moderation effects of problem gambling severity. Subjective norms were influential on college students with greater problem gambling severity, while attitude was the strongest predictor of recreational sports gamblers.								
Wardle and McManus (2021)	UK	Online panel	Young adults	3549	Range: 16-24; M: 19.9, SD 2.3 (male), M: 20.6, SD:2.4 (female)	46%	Cross-sectional	2	To examine the association between suicidality (suicidal thoughts and suicide attempts) and problem gambling specifically for young adults in Great Britain

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
	Main findings: Problem gambling was associated with suicide attempts in both young men and young women. This association persisted after adjusting for anxiety, impulsivity, life satisfaction, and other factors, which suggests that other mechanisms, such as the severity and multiplicity of harms experienced, or gambling to cope with life stressors, might underpin this relationship. Young people with problem-gambling behaviours should be considered at risk for suicidality.								
Wardle and Zendle (2021)	UK	Online panel	Young adults	3549	Range: 16-24; M: NR; SD: NR	51%	Cross-sectional	1	To examine the relationship between the purchase of loot boxes, gambling behaviour, and problem gambling among young people ages 16–24.
	Main findings: The purchase of loot boxes was highly associated with problem gambling, the strength of this association being of similar magnitude to gambling online on casino games or slots. Young adults purchasing loot boxes within video games should be considered a high-risk group for the experience of gambling problems.								
Whiteside, Heyeres, Maltzahn, Griffin, and MacLean (2020)	Australia	NA	NA	NA	NA	NA	Systematic Review	3	To systematically search and review the literature relating to interventions designed for Indigenous populations that seek to prevent or address gambling harm, to support the design of new programs.
	# of included articles: k=4; Study design: Studies relating to interventions for Indigenous populations that seek to prevent or address gambling harm; Participant type: Indigenous; Years covered: 2000-2019. Main findings: Only four articles were identified for inclusion: two described programs in Australia and two in New Zealand. Only one article provided outcome data, which was inconclusive, and one described three separate interventions. Three of the four described involved community-led approaches informed by cultural and emancipatory principles. There is currently insufficient evidence to guide interventions aiming to prevent and address gambling harm for Indigenous peoples. This review identified an urgent need for new intervention research in this area.								
R. J. Williams, Y. D. Belanger, et al. (2021)	Canada	General population (representative)	Indigenous	23952 (including 1324 indigenous)	Range: 18+; M: NR; SD: NR	NR	Cross-sectional	3	To provide an updated and comprehensive profile of Canadian Indigenous gambling in 2018.
	Main findings: Compared to non-Indigenous problem gamblers, Indigenous problem gamblers had higher substance use and lower impulsivity. In general, variables predictive of Indigenous problem gambling were the same ones predictive of problem gambling in all populations, with elevated Indigenous problem gambling rates primarily being due to elevated rates of these generic risk factors. Many of these risk factors are modifiable. Particular consideration should be given to reducing the disproportionate concentration of EGMs in geographic areas having the highest concentration of Indigenous people and ameliorating the disadvantageous social conditions in this population that are conducive to mental health and substance use problems.								
Wong, So, and Chu (2021)	Hong Kong	Universities	Students	510	Range: NR; M: 23.0; SD: 5.1	59%	Cross-sectional	2	To examine gambling behaviour and correlates of pathological gambling among college and university students in Hong Kong.
	Main findings: Results indicate the prevalence rate of lifetime, and past-year gambling are 79.6% and 41.8% respectively with male domination. Many (60%) started gambling before 18 years. The estimate of lifetime vulnerability to pathological gambling is 14.7%. Pathological gambling is associated with male gender, internet gambling, monthly gambling expenditure, gambling attitude, betting on a great variety of games, and life dissatisfaction.								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
Xue, Zeng, Liu, and Marks (2021)	China	General population (convenience)	General population	364	Range: 18-73; M: NR; SD: NR	54%	Cross-sectional	3	To develop a better understanding of people's values in order to explain the development and maintenance of gambling behaviour in Asian culture, so that effective intervention or prevention programs can be introduced.
	Main findings: Correlational and mediational analyses revealed that the relationship between an individualistic worldview and gambling intention was fully mediated by gambling risk perception. Respondents with an egalitarian worldview perceived greater risk associated with gambling than those with other worldviews.								
Zhai et al. (2021)	USA	Schools	Youth	1517	Range: NR; M: NR; SD: NR	NR	Cross-sectional	1	To systematically examine relationships between lottery-purchasing and problem-gambling severity and gambling perceptions and attitudes, as well as differences in the relationships between problem-gambling severity and measures of health/functioning and gambling characteristics among lottery-purchasing groups.
	Main findings: Adolescents who purchased lottery tickets had greater problem-gambling severity and reported more permissive gambling attitudes and greater parental approval of gambling than those who did not. Significant between-group differences were observed, with at-risk/problem-gambling more likely to have friends and adult gambling partners among non-lottery-purchasing adolescents, while machine and online gambling, and gambling alone was more strongly associated among lottery-purchasing adolescents. Greater problem-gambling severity, permissive gambling attitudes, and parental approval of gambling in lottery-purchasing adolescents suggest that parenting contexts are important considerations in prevention efforts targeting problem gambling in youths. Between-group differences in associations between problem gambling severity and gambling types and partners may identify high-risk groups associated with more solitary gambling behaviours for whom targeted interventions may be adapted.								
Zhang, Yang, Tong, and Wu (2020)	China	Universities	Students	283	Range: 18-27; M: 20.5; SD: 1.2	60%	Longitudinal	2	To test the potential bidirectional relationships among purpose in life (PIL), self-reported GD symptoms, and psychological flourishing
	Main findings: The results of cross-lagged analysis did not show the hypothesized reciprocity between GD symptoms and psychological flourishing ($P > 0.05$). However, PIL significantly predicted fewer GD symptoms ($b = 0.23$, $P < 0.001$) and higher levels of psychological flourishing (b 5 0.30, $P < 0.001$) in the follow-up study. Moreover, psychological flourishing predicted PIL a year later. The findings demonstrate the potential efficacy of purpose/meaning oriented interventions in gambling prevention and in well-being promotion programs.								

Footnotes:
Subtheme 1: Youth; Subtheme 2: Young adults; Subtheme 3: CALD and indigenous; Subtheme 4: Family violence; Subtheme 5: Homelessness
a Studies used the same sample

Table of Included Studies Theme 5: Emerging technologies

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - theme	Study aims
Abarbanel, Macey, Hamari, and Melton (2020)	NR	Online panel	Gamers	1368	Range: 18-80; M: 37.83; SD: 13.85	62%	Cross-sectional	1	To examine the rates of participation in esports betting in a sample of online gamers.
	Main findings: 10.8% of past 12-month gamers had bet on e-sports.								
André, Håkansson, and Claesdotter-Knutsson (2021)	Sweden	Online panel	Gamblers	1007	Range: 18+; M: NR; SD: NR	75%	Cross-sectional	2	(1) To explore the prevalence and characteristics of engaged-/problem- and addictive gaming within a population of gamblers; and (2) To investigate whether engaged gamers, problem gamers and/or addicted gamers show disproportionate prevalence of problem gambling.
	Main findings: (1) In a sample of gamblers, 26% were considered addicted gamers (i.e., met all 5 core criteria based on the Game Addiction Scale) and 47% were classified as problem gamblers (i.e., endorsed 2-3 of these core criteria). (2) 56% of addicted gamers and 17% of problem gamers also met criteria for problem gambling.								
Beranuy et al. (2020)	Spain	Vocational training centres	Youth gamers	535	Range: 15-25; M: 18.35; SD: 2.13	79%	Cross-sectional	2	To translate and adapt the IGDS9-SF into Spanish, as well as to obtain indicators of convergent validity with online gambling disorder.
	Main findings: (1) Scores on the IGDS9-SF and the OGD-Q had a value of $r = 0.440$, $p < 0.001$ ($n = 101$).								
Biegun, Edgerton, and Roberts (2021)	Canada	Universities	Youth gamers	651	Range: 18+; M: 21; SD: NR	47%	Cross-sectional	2	To explore the relationship between problem online video gaming and problem gambling.
	Main findings: (1) Problem online video gambling was correlated with problem gambling (r=.105). (2) Problem gambling was not an independent predictor of problem video game playing, in a multivariate model including anxiety, depression, stress, time, impulsivity, mental health, life satisfaction, self-esteem, social alienation, sex and gambling motivations.								
Brosowski, Turowski, and Hayer (2020)	Germany	Schools	Youth	1178	Range: 12-17; M: 13.60; SD: 1.40	48%	Longitudinal	1	(1) To examine the prevalence participation rates for simulated gambling. (2) To assess the impact of past year participation on four types of simulated gambling (video games, apps, social network, demo games) on problem gambling 12 months later.

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
	Main findings: (1) 50.29% of participants had participated in simulated gambling activities from home or via a mobile device in the past 12 months. (2) Mediation analyses revealed that there was a total positive effect for simulated gambling via apps on subsequent problem gambling (i.e., increasing problem gambling) and a positive direct effect for simulated gambling within video games on subsequent problem gambling.								
Chamboko and Guvuriro (2021)	Kenya	General population (representative)	General population (digital credit card users)	1040	Range: 16+; M: NR; SD: NR	55%	Other (Secondary analysis)	3	To investigate the role of betting via digital credit cards on financial distress, coping strategies and the welfare of bettors.
	Main findings: (1) Of the 1040 digital credit card users, 29% were identified as bettors. (2) After controlling for socio-economic and demographic factors, bettors that use digital credit cards are significantly more likely than non-bettors to be financially distressed, engage in welfare undermining coping strategies, and have inferior welfare outcomes.								
Close et al. (2021), Close and Lloyd (2021)	International sample	Secondary analysis of six open-access databases	Other: Loot box purchasers	7771	Range: NR; M: NR; SD: NR	NR	Other (Secondary analysis)	1	To examine the relationship between loot box expenditure and gambling problems.
	Main findings: Significant correlation between problem gambling and loot box expenditure. Higher spending players ($100+ per month) have considerably higher problem gambling scores than lower spending players (<$100 per month).								
Columb, Keegan, Griffiths, and O'Gara (2021)	Ireland	Schools	Youth	234	Range: 12-18; M: 14.20; SD: 1.60	67%	Cross-sectional	1	To explore the participation and expenditure rates of microtransactions in a sample of secondary school students.
	Main findings: (1) 64.1% of participants used micro-transactions. In-game currencies (83.5%), loot boxes (24.6%), in-game advancements (11.0%) and expiration (8.5%) were the most common forms used. (2) Participants mostly spent between €1-20 (41.5%) on micro-transactions, followed by €20-50 (25.4%) and €50-100 (14.4%) per year.								
Conlon and McGee (2020)	International sample	Publicly available data	Other (Lucky Bit [Bitcoin] gaming wallet users)	NR	NR	NR	Longitudinal	3	To examine whether gambling volume on the blockchain predicts Bitcoin price changes.
	Main findings: Changes in the volume spent on the most lottery-like gambling wallet explain 32% of variation in the returns to the Bitcoin price pre-2016, but this effect disappears post-2016.								
DeCamp (2021)	USA	Schools	Youth	13042	8th grade students: Range: Predominantly 13-14; M: NR; SD: NR 11th grade students: Range:	NR	Cross-sectional	1	To examine the participation rates of loot box purchasing in secondary school students

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
					Predominantly 16-17; M: NR; SD: NR				
	Main findings: 8th grade participants: 48.5% reported that they played video games but did not purchase any loot boxes, 10.3% purchased 1-5 loot boxes, 4.0% purchased 6-10 loot boxes, 3.2% purchased 11-20 loot boxes, and 7.4% purchased more than 20 loot boxes in the past year. 11th grade participants: 43.0% reported that they played video games but did not purchase any loot boxes, 7.1% purchased 1–5 loot boxes, 2.8% purchased 6–10 loot boxes, 1.8% purchased 11–20 loot boxes, and 5.3% purchased more than 20 loot boxes in the past year								
Delfabbro, King, Williams, and Georgiou (2021)	Internation al sample	Online panel	Gamblers & crypto currency traders	543	Range: 18+; M: NR; SD: NR.	72%	Cross-sectional	1	To examine the relationship between gambling, problem gambling and the intensity of crypto-currency trading.
	Main findings: (1) 42.1% of participants traded crypto-currency once a month, with 24.1% trading 2-3 times per month, 10.0% weekly, 16.7% 2-3 times per week and 7.0% daily. (2) Rates of moderate risk and problem gambling were lowest for the cryptocurrency only group, but significantly higher for those who engaged in both sports betting and cryptocurrency rather than just sports betting on its own. (3) The most consistent predictor of intensity of cryptocurrency behaviour was PGSI scores, with higher scores associated with greater cryptocurrency engagement.								
Estévez et al. (2020)	Spain	Schools & Clinical (Gambling)	Youth & Help-seeking gamblers	Youth: 250; Help-seeking gamblers: 31 patients	Youth: Range: NR; M: 18.20; SD: 4.90 Help-seeking gamblers: Range: NR; M: 20.80; SD: 2.40	Youth: 50 % Help-seeking gamblers : 90%	Cross-sectional	2	To estimate the co-occurrence of gambling disorder with other addictions, as well as to analyse the relationship between comorbid addictions present in people with gambling disorder as compared to those without gambling disorder.
	Main findings: The rates of comorbidity between gambling disorder and video game addiction was 0% in both the youth and help-seeking samples. Correlation analyses indicate that gambling disorder was positively correlated to video gaming addiction in the help-seeking sample but not the youth sample.								
Estevez, Jauregui, Macia, et al. (2021)	USA	Schools, Vocational Training Centres & Universities	Youth gamblers	614 (Non-problem gamblers: 560; Problem gamblers: 54)	Non-problem gamblers: Range: NR; M: 15.28; SD: 1.78 Problem gamblers: Range: NR; M: 16.12; SD: 1.76	Non-problem gamblers : 53% Problem gamblers : 62%	Cross-sectional	2	To explore the differences between problem gamblers and non-problem gamblers in video gaming.
	Main findings: (1) Problem gamblers had higher videogame use scores than non-problem gamblers. (2) There was a positive correlation between gambling severity and videogame use.								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
Ford and Håkansson (2020)	Sweden	Online panel	General population	2038	Range: 18+; M: NR; SD: NR	45%	Cross-sectional	2	To investigate potential associations between problem gambling and numerous other health conditions, including problematic gaming.
	Main findings: (1) 8.62% of participants had comorbid gambling and gaming problems. (2) Significant associations were found between problem gambling and problem gaming.								
Garea et al. (2021)	NA	NA	NA	NA	NA	NA	Systematic review	1	To examine the relationships between loot box spending and problem gambling.
	# of included articles: k=15 Study design: Any study design that presented the association between loot box spending and gambling problems. Participant type: No eligibility criteria. Years covered: Up until 28/02/2020. Main findings: Small-to-moderate positive correlations between loot box spending and gambling problems (r = 0.26, 95% CI 0.15, 0.38).								
Greenacre, Akbar, Brimblecombe, and McMahon (2020)	Australia	Routinely collected gaming venue data	Gamblers	NR	Range: NR; M: NR; SD: NR	NR	Other (Secondary analysis of routinely collected data)	3	To evaluate the impact of cashless debit cards on gambling behaviour.
	Main findings: Once monthly variation was controlled for, there was no significant effect of the introduction of the cashless debit card on gambling revenue.								
Greer, Rockloff, and Russell (2021) a	Australia	Online panel & General population (convenience)	Gamblers or gamers	1716	Esports bettors/skin gamblers: Range: 18+; M: 32.02; SD: 9.57 Sports bettors: Range: 18+; M: 44.53; SD: 10.83 Esports viewers: Range: 18+; M: 28.42; SD: 8.85 Video gamers: Range: 18+;	Esports bettors/ skin gamblers: 67% Sports bettors: 85% Esports viewers: 70% Video gamers: 52% Male	Cross-sectional	1	(1) To explore the gambling behaviour profiles of esports bettors and skin gamblers. (2) To explore whether esports bettors and skin gamblers are at a greater risk of gambling problems and gambling harm.

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
					M: 37.91; SD: 12.97				
	Main findings: (1) 41.5% of the sample participated in esports cash betting, esports skin betting and skin gambling on games of chance, with participants most often gambling on esports with money (65.9%), esports with skins (57.5%) and skins gambling on chance (41.1%). (2) Compared to sports bettors, esports bettors/skin gamblers were at greater risk for gambling problems (Esports bettors: low-risk=10.1%, moderate-risk=15.6%, problem gambling: 66.9%; Sports bettors: low-risk=23.7%, moderate-risk=25.7%, problem gambling: 17.3%) and gambling-related harms (Esports bettors: M=4.58, SD=3.13; Sports bettors: M=1.93, SD=2.90). (3) Being an esports bettor/skins gambler (vs sports bettor) was the strongest predictor of experiencing gambling problems and gambling-related harms. (4) Compared to esports viewers of video gamers, esports bettors/skins gamblers were more likely to experience gambling problems and a greater number of gambling harms.								
Greer, Rockloff, Russell, et al. (2021) a	Australia	Online panel	Gamblers	598	Range: 18-77; M: 38.92; SD: 12.03	71%	Cross-sectional	1	To investigate the differences in gambling behaviour, gambling problems and gambling harms in esports bettors compared to gamblers engaged in traditional sports betting.
	Main findings: (1) Of the 598 participants, 298 were esports bettors. (2) Compared to sports bettors, a greater proportion of esports bettors engaged in frequent gambling (i.e., at least fortnightly) on traditional gambling activities. (3) On average, esports bettors had higher problem gambling severity scores, and were more likely to meet the criteria for problem gambling (64.8%), compared to sports bettors (17.3%). (4) Esports bettors experienced more gambling harms than sports bettors, and were more likely to be identified as harms (1+ harms).								
Hall, Drummond, Sauer, and Ferguson (2021)	USA, Australia & Aotearoa New Zealand	Online panel	Gamers	1144 (US: 930; Australia: 173; Aotearoa New Zealand: 41)	Range: 19 to 80; M: 31.4; SD: 10.5	54%	Cross-sectional	1	To examine the effects of self- isolation and quarantine on excessive gaming and loot box spending, and to examine the association between problem gambling symptomatology and loot box spending.
	Main findings: (1) On average, participants reported spending $2.98 USD (SD=$11.48 USD; Range =$0 - $107.10 USD) on loot boxes in the previous month. (2) There were no differences in spending on loot boxes and risky loot box use scores between participants in self-isolation/quarantine and those not. (3) Problem gambling symptomology was associated with higher loot box spending, with a stronger association for participants who were self-isolated or quarantined than those who were not.								
Ide et al. (2021)	Japan	General population (convenience)	Youth	2619	Range: 14; M: NR; SD: NR	53%	Cross-sectional	1	To investigate the association between loot box purchasing among adolescents and parents, and problem online gaming in population-based samples.
	Main findings: Of the 2619 participants, 1615 adolescents were online gamers. Of these 1615 online gamers, 3.5% reported purchasing loot boxes. Of the 1615 primary caregivers of adolescent gamers, 31.8% played online games and 6.0% purchased loot boxes.								
Jauregui et al. (2020)	Spain	Schools & Universities	Youth	1099	Range: 12-30;	49%	Cross-sectional	2	To examine the association between gambling disorder and comorbid addictive disorders (i.e., videogames)

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
					M: 15.50; SD: 2.17				and examine the differences in comorbid behaviours in relation to gambling severity profile.
	Main findings: (1) Positive correlation between gambling problems and videogame use problems. (2) When compared to non-problem gamblers, problem gamblers scored higher on videogame use problems.								
A. King et al. (2020)	USA	Online panel	Youth	263	Range: 18-25; M: 22.79; SD: 2.00	49%	Cross-sectional	1, 2	To examine the comorbidity between problematic gaming and gambling behaviours in emerging adults, as well as explore if problematic engagement in gaming and gambling may be explained by recent trends in video game microtransactions (e.g., loot boxes) and risk-taking behaviours.
	Main findings: (1) Of the 263 participants, 59.7% (n=157) reported playing a video game with microtransactions at least once in their lifetime. Of these 157 participants, 55.4% indicated they spend money on these in-game purchase options each month, 6.4% of these microtransaction-game players reported previously spending over $100.00 (USD) on a single video game title, with two participants reporting expenditures of $1,000.00 and $2,000.00 (USD). (2) Around one-third of gamers reported experiencing problems related to microtransactions (31.4%), with feelings of obligations to purchase microtransactions and monthly transaction rates having the strongest associations with gambling disorder. (3) Relative to non-gamblers, problem gamblers were 5.62 times more likely to problem game; and relative to non-gamers, problem gamers were 6.45 times more likely to problem gamble. (4) Microtransaction engagement acts as a partial mediator in the relationship between internet gaming disorder and gaming disorder, with participants reporting more problematic video game behaviours more likely to purchase microtransactions and report more problems associated with gambling.								
Kolandai-Matchett and Wenden Abbott (2021)	NA	NA	NA	NA	NA	NA	Systematic review	1, 2	(1) the contexts and drivers of gaming-gambling convergence; and (2) the evidence on impacts, risks, and harm resulting from participation in gambling-like games and gambling activities with gaming features.
	# of included articles: k=108; Study design: Any study design and article type including commentaries and editorials; Participant type: Any locality, age group or sample size. Years covered: 2008-2020. Main findings: (1) Findings indicate convergence in multiple overlapping contexts (gaming elements in gambling, games incorporating gambling elements, gambling on games, free simulated online gambling, and social media games and gambling) driven by technological advances and commercial interests. (2) Transitions from games to gambling are suggested in a considerable number of cross-sectional studies and in a small number of prospective studies. The co-occurrence of gaming and gambling disorders has suggested the potential for risk and harm; however, the present evidence base is thought to be generally too weak to affirm relations between these two disorders.								
Kotyuk et al. (2020)	Hungary	Schools & Universities	Youth	3003	Range: 18-28; M: 21.00; SD: 2.80	43%	Longitudinal	2	To investigate the co-occurrences of a wide range of substance use and behavioural addictions.
	Main findings: 0.5% of the sample experienced co-occurring problematic gambling and problematic online gaming.								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
Lelonek-Kuleta and Bartczuk (2021)	Poland	Online panel	Gamers or Gamblers	438	Range: 18-64; M: 33.10; SD: 9.30	63%	Cross-sectional	1	To explore factors that explain esports betting addiction.
	Main findings: (1) Of the respondents, 11.6% bet on esports once a month, 9.4% almost daily and 1.6% daily. Respondents most often indicated spending PLN 10 on one esports betting session (27.2%), followed by PLN 20 (22.1%), less than PLN 5 (15.5%), PLN 50 (8.9%) and more than PLN 50 (2.3%). Most respondents spent between 15 and 30 minutes (29.9%) on a single esports betting session, followed by less than 15 minutes (29.0%), up to 1 hour (24.4%), between 1 and 2 hours (10.5%) and more than 2 hours (6.2%). (2) 67.4% of esports bettors had also made payments in free online gamers to purchase various add ones. (3) Of esports bettors, 17.8% were classified as non-problem gamblers, 19.6% as low-risk gamblers, 27.6% as moderate-risk gamblers and 34.9% as problem gamblers. (4) Analyses exploring factors that are predictive of gambling disorder in esports bettors revealed that: (i) demographic variables were not significant; (ii) among the psychological variables, coping strategies (escape and engaged), financial gambling motives were significant; and (iii) among the game-involvement variables, game time, money spent on one game session, e-gambling activities and payments made in pay-to-win games were significant.								
Macey and Kinnunen (2020)	Finland	General population (representative)	General population	946	Range: 10-77; M: 43.00; SD: NR	50%	Cross-sectional	1	To investigate the association between social casino games and real money gambling, overall digital game play, free-to-play game play and the use of microtransactions.
	Main findings: (1) 34.5% of respondents reported playing free-to-play games, with more than half of these respondents making microtransaction when playing these games. (2) 6.6% of respondents had gambled on social casino games. (3) Social casino game play was associated with lower levels of educational attainment, younger males, increased digital game play, gambling in digital games, increased use of free-to-play games, and microtransactions. Positive associations were also found between social casino game play and established forms of gambling, both online and offline.								
Marchica et al. (2021)	USA	Schools	Youth gamblers and gamers	1348	Range: NR; M: 14.67; SD: 1.73	64%	Cross-sectional	1	To explore the effect of the frequency of participation in various gambling activities and video gaming intensity (i.e., how often do you play 2þ hours of video games in a day) onto both externalizing and internalizing
	Main findings: (1) Approximately 20% (n=263) of the included sample had bet on esports during the past year. (2) Esports betting was positively correlated with other forms of gambling, problem gambling and problem video gaming. (3) Mediation analyses revealed esports betting was associated with both internalizing and externalizing problems through problem video gaming but not problem gambling.								
J. Meng and Fu (2020)	International sample	Gambling site	Gamblers	NR	NR	NR	Longitudinal	3	To examine gambling strategies and the complex dynamic of risk attitudes involved in betting decisions utilising real-life gambling data (i.e., cryptocurrency-based casino blockchain data).
	Main findings: This study highlighted interesting patterns of gambling behaviour in users of this cryptocurrency-based casino: (1) a large proportion (approx. 60%) of gamblers were recreational (with 0–10 total lifetime bets). (2) a nearly normal distribution of gamblers by their cumulative profit, which is								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
	expected given from the 1% house commission. (3) users follow a generally more loss-averse distribution of probabilities. (4) some users display strategic time inconsistencies, gain-exit and loss-exit strategies, and loss-chasing behaviour.								
Mills et al. (2020)	Canada	Universities, online panel & general population (convenience)	Youth gamblers or gamers	1621	Range: 18-27; M: 20.55; SD: 2.70	46%	Cross-sectional	2	To explore the role of substance use-related factors in the co-occurrence of problem gambling and problem video gaming.
	Main findings: (1) 2.2% of participants were at-risk for both problem gambling and problem video gaming. (2) Participants with problem gambling and problem video gaming were more likely to use substances monthly or less or weekly or more compared to no substance use and were more likely to have used cigarettes weekly or more.								
Puiras, Cummings, and Mazmanian (2021)	Canada	Universities	General population	383	Range: 19-58; M: 22.30; SD: 5.90	26%	Cross-sectional	2	To explore the differences in motivating factors between gamblers and gamers and how individuals use gambling and gaming activities to escape from reality.
	Main findings: (1) 34.9% of participants indicated that they both gamble and game. (2) Participants who gamble and game showed greater levels of positive and negative escapism, compared to participants who were gamers only but not gamblers only.								
Rockloff et al. (2020) b	Australia	Online Panel	Youth	1954 Youth: 919 Young adults: 1035	Adolescents: Range: 12-17; M: 15.04; SD: 1.66 Young adults: Range: 18-24; M: 20.73; SD: 2.00	39%	Cross-sectional	1	To identify the prevalence of loot box use amongst adolescents and young adults
	Main findings: (1) 93.2% of respondents had played a game with loot boxes in them within the last 12 months. (2) Of people who obtained loot box rewards in games, 6.8% of respondents had sold at least some of these rewards for cash.								
Rockloff et al. (2021) b	Australia	Online Panel	Youth	1954	Range: 12-24; M: NR; SD: NR	39%	Cross-sectional	1	(1) To relate play on games with loot boxes, as well as opening, purchasing, and selling loot boxes to current gambling, and experiences of gambling problems and harm. (2) To relate longer-term experiences with loot boxes to current gambling, and experiences of gambling problems and harm.

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
	Main findings: Young adult (18-24 years) results: (1) Women (but not men) who played loot box games and opened loot boxes experienced more gambling-related problems and harms. (2) Men and women who bought loot boxes had more gambling-related problems and harms. (3) Men who sold loot boxes had more gambling-related problems and harms, but women only had more gambling-related problems. (4) no evidence that longer experience with loot boxes was associated with gambling problems or harms. Adolescent (12-17 years) results: (1) Girls who opened, bought and sold loot boxes had more gambling-related problems, with no difference on playing games with loot boxes. (2) Boys who bought loot boxes had more gambling-related problems, with no differences on playing games with loot boxes, opening or selling loot boxes. (3) longer experience with opening loot boxes was associated with fewer gambling-related problems for girls only.								
Scholten, Zendle, and Walker (2020)	International sample	Gambling site	Gamblers	2,232,741 transactions	NR	NR	Longitudinal	3	To examine the profile of gamblers on decentralised gambling applications, in particular their spending profiles.
	Main findings: The typical player spends approximately $110 equivalent across a median of 6 bets in a single day, although heavily involved bettors spend approximately $100,000 equivalent over a median of 644 bets across 35 days. The average decentralised gambling application player spends less than in other online casinos overall, but that the most heavily involved players in this new domain spend substantially more.								
Shi et al. (2021)	NA	NA	NA	NA	NA	NA	Systematic review	1	To explore the convergence of gambling and videogaming in relation to age restrictions and other harm reduction measures.
	# of included studies: NR; Types of study design included: NR; Types of participants included: NR; Years covered in the search: 2-18 February 2020. Main findings: 1) While videogames that include gambling like features or free-to-play gambling related games (e.g., social casino games) vary in regard to age restrictions and their enforcement, and gambling-related games without monetary wagering typically do not meet the legal criteria for gambling, studies have shown relatively high rates of social casino game play in adolescents, with these gamers more likely to experience gambling problems. 2) Moreover, studies have shown that the majority of adolescents who gamble online report having participated earlier in games on free-to-play websites, indicating that adolescents are likely to view gambling as safe and healthy. 3) Lastly, research has shown that microtransactions in simulated gambling games are associated with subsequent gambling.								
Shinkawa, Irie, Tanaka, and Yokomitsu (2021)	Japan	Schools	Youth	335	Range: 12-15; M: NR; SD: NR	52%	Cross-sectional	1	(1) What percentage of junior high school students are involved in in-game purchasing? (2) How much and under what circumstances do they make unplanned in-game purchases?
	Main findings: (1) 30.7% of students had previously made in-game purchases, and at least 14.0% had made unplanned in-game purchases. (2) 19.2% of the users who had made unplanned purchases had spent greater than or equal to their actual monthly allowance within the past month.								
Sonkurt and Altinoz (2021)	Turkey	General population (convenience)	Other (cryptocurrency investors)	300	Range: 18+; Mean: NR; SD: NR	97%	Cross-sectional	1	(1) the pathological trading behaviour and frequency among cryptocurrency investors. (2) additional gambling disorders in cryptocurrency traders.

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
	Main findings: (1) In a sample of cryptocurrency investors, 2.0% had a possible gambling disorder. (2) There was no difference between investors who tracked the value of cryptocurrency hourly or less (compared to others) on problem gambling scores. (3) There was no difference between day traders and others on problem gambling scores. (4) Pathological cryptocurrency trading was positively associated with gambling.								
Spicer et al. (2021); Close and Lloyd (2021)	NA	NA	NA	NA	NA	NA	Systematic review	1	To examine the relationship between loot box purchasing and problem gambling.
	# of included studies: k=13; Types of study design included: empirical studies that explored the association between loot boxes and problem gambling; Types of participants included: NR; Years covered in the search: up until 28 March 2020. Main findings: A moderate positive association between loot box purchasing and problem gambling was identified, with a mean effect of r=0.27.								
Stark, Reynolds, et al. (2021)	Canada	General population (representative)	Youth & Other (parents with children aged from 8-17)	2651 (Adolescents: 678; Young adults: 973; Parents: 1000)	Adolescents: Range: 12-17; M: NR; SD: NR Young adults: Range: 18-24; M: NR; SD: NR Parents: Range: 35-54; M: NR; SD: NR	Adolescents: 53% Young adults: 50% Parents: 36%	Cross-sectional	1	To improve our knowledge of gambling and gaming behaviours, as well as their convergence, by examining a sample of young people aged 8 to 24 and parents of children 8 to 17 years in Ontario.
	Main findings: Adolescents: 23.0% of adolescent gamblers had played social casino games and 16.9% played video games for money or something of value. Male adolescents were more likely to have played video games for money than females, with no gender differences in social casino game participation. Adolescents that played video games for money and social casino games were more likely to be classified as low to moderate and high severity, than adolescents who had not. Among adolescent gamers 28.6% have ever spent money within a video game (i.e., in-game purchasing). Young adults: 20.1% of young adult gamblers had played social casino games and 17.7% played video games for money or something of value. Young men were more likely to have played video games for money than females, with no gender differences in social casino game participation. Young adults who played video games for money were more likely than those young adults who had not to have moderate and severe gambling problems. Young adults who played social casino games were more likely than the young adults who had not to have severe gambling problems. Among young adult gamers, 47.1% spent money within a video game. Parents: 22.5% of parent gamblers had played social casino games and 8.4% played video games for money or something of value. There were no gender differences in social casino game participation or video game play for money. 33.8% of parents who thought their child had gambled thought they had played on social casino games. Parents who had played video games for money and social casino games were more likely to be at moderate or high risk of gambling harm than those parents who had not. Among parents of child gamers, 16.9% thought their child had spent								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
	money within a video game.								
Steinmetz, Fiedler, von Meduna, and Ante (2021) c	Germany	General population (representative)	Gamers & Gamblers	Pay-to-Win Population: 1508 Everyday Pay-to-Win Buyer: 124 Occasional Pay-to-Win Buyer: 1384 Online Gambler (subset of Play-to-Win players): 700 Online Gambler (full sample without Play-to-Win players): 4492	Pay-to-Win Population: Range: 18+; M: 43.09; SD: NR Everyday Pay-to-Win Buyer: Range: 18+; M: 41.02; SD: NR Occasional Pay-to-Win Buyer: Range: 18+; M: 43.36; SD: NR Online Gambler (subset of Play-to-Win players): Range: 18+; M: 36.60; SD: NR Online Gambler (full sample without Play-to-Win players): Range: 18+; M: 44.42; SD: NR	Pay-to-Win Population: 49% Everyday Pay-to-Win Buyer: 62% Occasional Pay-to-Win Buyer: 48% Online Gambler (subset of Play-to-Win players): 55% Online Gambler (full sample without Play-to-Win players): 54%	Cross-sectional	1	To explore how Pay-to-Win gaming affects gambling participation, frequency and problematic behaviour and vice versa.
	Main findings: (1) 55.4% of the sample played Pay-to-Win games, with 54.1% of these participants making at least one payment in Pay-to-Win games during the last year. (2) Pay-to-Win gamers who purchase daily are participating each different gambling for more frequently, report higher frequencies of participation and higher gambling spend than occasional buyers. (3) 90.4% of daily Pay-to-Win buyers are at high risk for developing gambling behaviour.								
von Meduna, Steinmetz, Ante, Reynolds, and	Germany	General population (representative)	Gamers & Gamblers	Loot box purchaser: 586 Pay2Win users, but	Loot box purchaser: Range: 18+; M: 36.70; SD: NR	Loot box purchaser: 55% Pay2Win users, but	Cross-sectional	1	To explain the user structure of loot boxes, to evaluate usage intensity and related gambling problems, and to understand the influences on the purchase of loot boxes.

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
Fiedler (2020) c				not loot box purchaser: 922 Everyday loot box purchaser: 88 Loot box purchaser, but not every day: 498	Pay2Win users, but not loot box purchaser: Range: 18+; M: 47.20; SD: NR Everyday loot box purchaser: Range: 18+; M: 35.00; SD: NR Loot box purchaser, but not every day: Range: 18+; M: 37.00; SD: NR	not a loot box purchaser: 45% Everyday loot box purchaser: 68% Loot box purchaser, but not every day: 53%			
	Main findings: (1) 38.9 % of the Pay-to-Win user sample have purchased at least one loot box in the past 12 months (9.8% of entire sample). (2) 61.1% of the total sample are Pay-to-Win players but have not purchased a loot box in the past 12 months (15.4% of entire sample). (3) 29.0% of Pay-to-Win users who purchase loot boxes, purchase loot boxes daily or almost daily. (4) Participation in real money gambling per gambling form is unrelated to loot box participation except for online sports betting and eSports betting that is negatively related. Participation in casino gaming is the only gambling form that is positively related to loot box purchasing frequency; all other gambling forms are non-significant. No frequency of gambling participation of any game form has a significant effect on loot box purchasing yes/no, but the frequencies of playing lotteries and casino gambling are positively related to loot box purchasing frequency. (5) Participation in gambling for play money, and frequency of such participation, are both positively related to loot box purchasing and loot box purchasing frequency. Participation in play money gambling increases the likelihood of being a loot box user by 14.2% and the number of loot box purchases by 70.3. (6) Being a problem gambler yielded significant positive effects on loot box purchasing and loot box purchasing frequency but only when controlling for socio-demographic characteristics and not online gambling participation and frequency.								
(Wardle & Zendle, 2021) d	UK	Online panel	Youth	3549	Range: 16-24; M: NR; SD: NR	51%	Cross-sectional	1	(1) To explore the association between loot box purchase and problem gambling among those 16–24 years of age. (2) to explore if any observed relationship between loot box purchase is attenuated or explained by engagement in other gambling activities to test the gambling involvement hypothesis.
	Main findings: (1) 12.1% of the sample had purchased loot boxes in the past year. (2) Loot box purchasers were more likely to experience problem gambling compared to those who hadn't purchased loot boxes (16.9% vs 1.8%). (3) The odds of problem gambling were 11.4 times higher among those who had purchased loot boxes in the past year.								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub - the me	Study aims
Wardle, Petrovskaya, and Zendle (2020) d	UK	Online panel	Youth	3549	Range: 16-24; Mean: NR; SD: NR	51%	Cross-sectional	1	To examine the demographic, socioeconomic, gaming and gambling profiles of esports bettors.
	Main findings: (1) 2.9% of the sample had bet on esports in the past year. (2) 53.0% of esports bettors were classified as problem gamblers.								
Yokomitsu, Irie, Shinkawa, and Tanaka (2021)	NA	NA	NA	NA	NA	NA	Systematic review	1	To identify the characteristics of people who purchase loot boxes with real money, focusing on the relationships between loot boxes and gambling.
	# included studies: k=20; Types of study design included: any study design that assessed the bivariate relationship between loot boxes and other variables; Types of participants included: NR; Years covered in the search: up to 27 March 2021. Main findings: (1) 14 of the 20 studies identified a positive relationship between loot boxes and problem gambling, with Spearman's rho correlations ranging from 0.33 - 0.35. (2) Greater problem gambling symptoms were also associated with greater expenditure on loot boxes. (3) Research has also shown that loot box purchases were positively related to gambling behaviour and harms caused by problematic gambling.								
Zendle (2020)	UK	Online panel (representative)	General population	1081	Range: 18+; M: NR; SD: NR	49%	Cross-sectional	1	To estimate the prevalence of a range of gambling-related video game practices, and examine the relationship between each of these practices and problem gambling.
	Main findings: (1) Any form of gambling-like video game practice: 18.5%; Esports betting: 2.9%; Loot box spending: 7.8%; Social casino spending: 3.7%; Real money video gaming: 1.7%; Token wagering: 2.2%. (2) Problem gambling was positively correlated with any form of gambling-like video game practice (r=0.23), esports betting (r=0.21), social casino spending (r=0.21), real-money video gaming (r=0.15), loot box spending (r=0.14) and token wagering (r=0.12).								
Zendle et al. (2021)	Internation al sample	General population (convenience)	Other (Players of collectible card games)	726	Range: 18+; M: NR; SD: NR	90%	Cross-sectional	1	To investigate the relationship between problem gambling symptomatology and collectable card games booster packs, which are structurally similar to loot boxes.
	Main findings: (1) Spending on physical booster packs in real-world stores ranged from a median of $12.90 to $33.75 depending on the problem gambling severity category. The median spend on physical booster packs in digital stores was $0.00 for all problem gambling severity categories. (2) There was no statistically significant effect of problem gambling severity on spending on physical booster packs in real-world stores. (3) There was a statistically significant effect of problem gambling severity on spending on spending on physical booster packs in digital stores, whereby low-risk gamblers spent less than moderate-risk gamblers.								

Footnotes:
Subtheme 1: Emerging technological gambling features and activities; Subtheme 2: The relationship between gambling and gaming; Subtheme 3: Emerging technologies and trends in payment methods
a Based on same study sample; b Based on same study sample; c Based on same study sample; d Based on same study sample

Note: Of the total included studies included in this theme, 16 studies used adolescent and/or young adult samples. This highlights the overlap between this theme and the youth/young adult subtheme within the gambling among vulnerable groups theme. For more information on the current status of the youth-related gambling research see Gambling among Vulnerable Groups theme.

Table of Included Studies Theme 6: Gambling industry products, practices, environments and regulation

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
Amazue, Awo, Agbo, Ekwe, and Ojiaku (2021)	Nigeria	Schools	General population (youth)	237	Range: 16-19; M: 17.37; SD: 4.13	100%	Cross-sectional	2	To examine near-miss as a psychological process that could help explain the contribution of illusion of control and interpretative bias in betting intention.
	Main findings: Results showed that near misses were positively associated with betting intentions and illusion of control (IC), but negatively correlated with interpretative bias (IB). Further, near-miss differentially mediated the effects of IB and IC on betting intention such that IB was associated with lower betting intention via near-miss, while IC was associated with higher betting intention via near-miss.								
Auer and Griffiths (2020)	Sweden	Gambling sites	Gamblers	7134	Range: NR; M: 42; SD: 12	63%	Longitudinal	4	To investigate the effect of personalised messaging on online bettors, specifically the effects of personalised feedback about their own past gambling behaviour on future gambling behaviour.
	Main findings: Ten out of 11 messages resulted in a decrease in average amount of money gambled on the day the message was received compared to average daily spend over the past seven days (with 65% of gamblers reducing the amount of money gambled). Similarly, for 9 out of 11 messages total spending over the next seven days was less than total spending for the seven days prior to receiving the message and total spend was significantly reduced in 60% of cases across all messages. The effects of messaging was stronger for those experiencing high losses and for no-low risk gamblers compared to those identified as at higher risk of gambling problems.								
Awo and Amazue (2021)	Nigeria	Schools	General population (youth)	407	Range: NR; M: 17.27; SD: 1.62	82%	Cross-sectional	2	To test whether predictive control moderates the influence of gambling near-miss on gambling intention. Specifically, that the association between near-miss and gambling intention would be contingent on the faulty belief that an individual can control and predict gambling outcomes.
	Main findings: Near miss was positively associated with gambling intentions and predictive control was negatively associated with gambling intentions. Moderator effects: Predictive control moderated the association between near-miss and gambling intention such that near-miss was strongly positively associated with lower gambling intention when predictive control was high or moderate (ie when participants thought they could control the outcome) but strongly negatively associated when predictive control was low (participant did not believe they could control the outcome).								
Badji et al., (2020a);	Australia	N/A (public and administration data)	General population	NA	NA	NA	Secondary analysis of area-level	5	To examine whether changes in the number EGM venues within a local area are associated with changes in the rates

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
Badji, Black, and Johnson (2019)							longitudinal data		of serious financial problems (personal insolvencies) in that community.
	Main findings: A one-venue decrease over time within a local area was associated with a reduction of 1.8 personal insolvencies per year. In addition, weak evidence that local areas with more clustered spatial distribution of EGM venues had increased level of insolvencies (over and above those associated with number of venues).								
Badji et al. (2020b)	Australia	NA: Publicly accessible dataset + geolocation data	General population	14,860 observations from 9,071 people	NR	NR	Cross sectional	5	To investigate the relationship between venue proximity (to home or local shopping) and gambling behaviour, and gambling harms.
	Main findings: Using local area calculations, people living further from EGM gambling venues were less likely to gamble (doubling the distance from a venue reduced the likelihood of gambling by 1.5% [M gambling rate 13%]). Effects and potential harms were more pronounced for those living very close to a venue (those living within 250m of a venue were 6% more likely to gamble and 5% more likely to experience financial hardship than those living >2km from a venue).								
Balem et al. (2021)	France	Online panels	Gamblers	Sports bettors: 5163; Horse race bettors: 3524	Sports bettors: Range: 18-94; M: 35; SD: NR Horse race bettors: Range: 18-95; M: 53; SD: NR	Sports bettors: 93% Horse race bettors: 87%	Longitudinal	1	To examine whether the use of wagering inducements has a significant impact on the gambling behaviours of online gamblers
	Main findings: Used results of a survey together with data extracted from online gambling accounts over 12-month period, finding that (1) Use of wagering inducements was associated with an increase of gambling intensity, gambling frequency, and risky gambling behaviours (eg chasing); (2) Effects were stronger for at-risk gamblers and in relation to sports betting and poker; (3) Effects were strongest in the week of their use, dissipating rapidly over time.								
Behavioural Insights Team (2021a)	UK	Gambling Sites	Gamblers	1731	Range: NR; M: 39.42; SD: NR	NR	RCT	4	To examine whether the way money values are presented when customers set a deposit limit affect the size of the chosen deposit limit and if this, in turn, impacts spending.
	Main findings: Participants were online gambling wagerers who had not previously set a deposit limit but who set a deposit limit after an invitation. Results showed that a no anchor (free text) condition or offering low anchor deposit conditions led to significantly lower limits being set (average of £866.50 in each of these conditions) compared to a BaU control condition that offered limits up to £100,000 + no limit option. Results also showed a pattern of lower deposits to accounts over 30 days but findings were not significant.								
Behavioural Insights Team (2021b)	UK	Gambling Sites	Gamblers	23592	Range: NR; M: 45.7; SD: NR	88%	RCT	4	To assess whether enhancing the functionality of industry-standard deposit limit tools to include a 'commitment device' (designed to dissuade gamblers

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
									from breaking intentions) impacts their use of the tool, and their subsequent behaviour.
	Main findings: A BaU deposit limit was compared to two experimental conditions where one of 2 commitment features were added (a) self-persuasion (advising another player setting a limit), and (b) personal commitment (setting a personal reason for limit). Study found of the k=861 customers who chose to set a deposit limit in response to a pop-up notification and/or email invitation, significantly *fewer* set a limit in the personal commitment (2.9%) or self-persuasive (3.6%) conditions compared to controls (4.4%). There was no evidence of difference in the deposit limits set between conditions, and no evidence that interventions affected other gambling-related outcomes including total bet or gambling expenditure in the 30 days post limit setting.								
Bjørseth et al. (2021)	NA	NA	NA	NA	NA	NA	Meta analysis	4	To conduct a systematic review and meta-analysis to study the effect of pop-up messages on gambling behaviour and cognitions.
	# of included studies: k=19 studies in 18 papers; Study designs: Included RCTs, quasi-experimental studies and pre-post studies investigating the effect of responsible gambling pop-up messages on gambling behaviours and/or gambling cognitions; Participant type: Any equal to or above the legal gambling age. Years covered: up to May 2020. Main findings: Findings of the meta-analysis showed moderate effects of pop up messages was g=0.413 for cognitive messages and g=.507 for behavioural messages. It was concluded that pop-up messages provide moderate effects on gambling behaviour and cognitions in the short-term and that such messages play an important role in the gambling operators' portfolio of responsible gambling tools								
Black et al. (2021)	Australia	General population (convenience)	Gamblers	462	Range: NR; M: 44.94; SD: 15.05	87%	Longitudinal	5	To examine whether restrictions to access to land-based gambling venues imposed during the COVID-19 pandemic impacted gambling problems and/or gambling engagement.
	Main findings: Comparisons between states experiencing and not experiencing restrictions to land-based gambling showed no significant differences in rates of gambling problems or in online gambling participation. Longitudinal analyses with states that had experienced early venue closures and later reinstatement, found a small overall reduction in gambling engagement at 2- and 5- months post restrictions (compared to typical gambling prior), but no change in gambling problems.								
Byrne and Russell (2020)	Australia	General Population (convenience)	General Population	213	Range: 18-80; M: 38.83; SD: 12.85	51%	RCT	4	To explore how additional interface elements on EGM screens containing only real-time play data affect an EGM gambling session.
	Main findings: A 2 (standard vs informative interface) x 2 (pop-up message absent vs present) between-subjects experimental design was implemented. Participants in the informed interface condition demonstrated increased accuracy of play estimates and were more likely to quit than spend winnings than those in the control group, but there was no significant difference in total spending or dissociation between experimental groups. Pop-ups increased tracking and accuracy of money spent. There was a significant interaction between interface condition and pop-up messages such that the presence of pop-up messages reduced enjoyment with the standard interface, but increased enjoyment when paired with an informative interface.								
Caillon et al. (2021)	France	General population (convenience)	Gamblers	58	Range: NR; M: 37; SD: NR	78%	RCT	4	To examine the effectiveness of different types of pop-up messages on different types of gambling and for different risk groups of gamblers.

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
	Main findings: Pre/post comparisons (T0/T1) found no significant differences between the two experimental groups (shown self-appraisal and informative pop-ups) and the control group (shown blank pop-ups) on money or time spent gambling prior to exposure vs during the experimental session with exposure to pop-ups. Pre/post comparisons after 15 days (T0/T2) found no significant difference between the experimental groups and the control group on money wagered but found significant interaction effects for online sport and horse gamblers in the self-appraisal condition such that they spent less time gambling and had increased gambling expectancies over time compared to control condition. Further, at-risk gamblers in the informative condition showed reductions in illusion of control over time while those in the control condition showed increases in the same factor.								
Challet-Bouju, Grall-Bronnec, et al. (2020)	France	General population + panels	Gamblers	171	Range: 18-65; M: 38; SD: 11.1	79%	RCT	1	To assess the impact of wagering inducements on gambling behaviours, cognitions, and emotions of online gamblers
	Main findings: Participants were randomly allocated to one of 4 experimental conditions (inducements of €10, €50, €100, or €200) or a control condition (no inducement), finding that inducements increased money wagered (significant from €100), gambling-related expectancies (variable effects and significant for €10 and €50 vs a decrease in pre/post session) and perceived loss of control (higher for experimental conditions over €10 and significant at €200). They did not influence time spent gambling.								
Challet-Bouju, Hardouin, et al. (2020)	France	NA: Data provided by gambling sites	Gamblers	1152	Range: 19-81; M: 39.83; SD=12.65	64%	Secondary analysis	3	To model the early gambling trajectories of individuals who play online lottery in order to identify at-risk gamblers.
	Main findings: Data generated from patrons' gambling activity identified 5 classes (profiles) of gamblers based on playing behaviour. The majority of gamblers (85.5%) clustered into three classes, had low-medium gambling activity and demonstrated no-low risk of gambling problems. Remaining gamblers clustered into two classes (4 & 5), displaying higher gambling activity (number of different games played) and high losses but were differentiated from each other on gambling risk signs with class 4 (9.7%) being predominantly classed as low-medium risk of gambling problems while class 5 (4.9%) displayed signs of gambling problems (eg chasing losses, high net losses), were mostly classified as medium-high risk of gambling problems and were also the only class to voluntarily self-exclude.								
Clifford, Theobald, and Arora (2021), study 1	UK	Online (GAMSTOP) self-exclusion users	Gamblers	41	Range: 18+; M: NR; SD: NR	NR	Qualitative	6	To capture the 'effectiveness' of GAMSTOP and stories to show consumers' journeys through using the scheme.
	Main findings: Themes largely followed questions asked and included (1) reasons for registering, (2) life before GAMPSTOP, (3) experiences of using GAMSTOP, (4) life after GAMSTOP, (5) use of other tools and support, (6) effects of lockdown on gambling, (7) improvements to GAMSTOP, (8) exclusion length preferences, finding that interviewees were generally positive about the effectiveness of GAMSTOP but highlighted some issues and opportunities for improvement.								
Clifford et al. (2021), study 2	UK	Online (GAMSTOP) self-exclusion users	Gamblers	1703	Range: 18+; M: NR; SD: NR	NR	Cross-sectional	6	To address key themes identified in qualitative interviews and assess GAMPSTOP's effectiveness.
	Main findings: Findings showed that 82% of GAMSTOP users had stopped or reduced their gambling since registration (5% gambling at same or higher rates to prior). It was most effective for those who want to stop gambling altogether. Findings also demonstrated improvements in wellbeing and feelings of control for the majority of users as well as in quality of family relationships.								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
Delfabbro and King (2020)	Australia	NA: Data from 7 gambling prevalence studies	General population	84394	Range: NR; M: NR; SD: NR	NR	Secondary analysis	1	To examine whether use of loyalty programs were more commonly reported by higher risk gamblers in large population studies conducted in Australia.
	Main findings: Six of these seven studies examined demonstrated consistent positive associations between loyalty card use and higher risk gambling in venue-based gamblers. Loyalty card use increased with gambling-related risk with at least 40% of problem gamblers (as identified by PGSI) reporting loyalty card use compared with only around 10% of non-problem gamblers in general. Findings from one study demonstrated a positive relationship between engagement in loyalty programs and gambling problems.								
Donati, Cabrini, et al. (2021)	Italy	Clinical (gambling)	Gamblers	135	Range: 22-78; M: 50.07; SD: 13.33	81%	Qualitative	5	To analyse problem gambling patients' gambling behaviour and craving during the COVID-19 lockdown and compare gambling disorder symptoms at the beginning of the treatment and during lockdown.
	Main findings: Most participants were abstinent at the time of COVID-19 lockdowns. Most reported feelings of indifference towards gambling during lockdown and significant improvements in their quality of life, with less gambling behaviour, gambling disorder symptoms, and less craving. No transference to online gambling was observed.								
Drosatos, Arden-Close, Bolat, and Ali (2020)	UK	General population (convenience) + Targeted sampling	Gambling experts and Gamblers	Experts: 13; Gamblers: 6	Experts % Gamblers: Range: NR; M: NR; SD: NR	Experts: 54%; Gamblers : 83%	Qualitative	4	To explore the range of data and modalities of interaction that can enhance persuasive interventions and/or support to limit setting
	Main findings: Gambling experts (researchers, service providers & RGO from gambling industry) and gamblers discussed a range of different limits (eg time, money, access), interactive persuasive interventions (eg visualisation techniques, infographics, corrective measures) and information sources (eg gambler player data collection) that could be used to support gamblers to maintain control of gambling.								
Edson, Tom, and LaPlante (2021)	USA	Gambling venue	Gamblers	1951	Range: 21-94; M: 56.1; SD: 13.1	37%	Cross-sectional	4	To examine casino patrons' reported use of and attitudes towards a precommitment system (PlayMyWay).
	Main findings: The vast majority of patrons (91.6%) had never enrolled in the voluntary system. Users who did not enrol (despite awareness) typically said they did not need reminders and warnings about gambling. Most of those who had enrolled paid little attention to notifications (22% typically stopped on 'approaching limit' notification, 40% on 'reaching limit', and 33% on 'exceeding limit' notification). The most common reasons for unenrolling were preferring to gamble without monitoring and being annoyed by budget notifications. At risk gamblers were more likely to unenroll from PlayMyWay, less likely to respond to and more likely to respond negatively to notifications.								
Engebo et al. (2021)	Norway	General population (representative)	General population	28251	Range: NR; M: NR; SD: NR	50%	Cross-sectional	5	To examine the effects of two regulatory market changes in Norway (1) a restriction of availability when slot machines were banned from the Norwegian market in 2007, and (2) the

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
									introduction of regulated online interactive games to the same market in 2014.
	Main findings: The ban on EGMs (slot machines) in 2007 was associated with a reduction in EGM gambling over time (from 18.7% in 2005-07 down to 1.5-1.6% in 2008-13 and 2014-18) and a reduction in overall gambling participation (from 82.1% down to 76.3% and 72.7%). A general increase in gambling on foreign websites was observed over time but much lower than the reduction in EGM gambling (3.6% up to 4.2-4.5%). The introduction of regulated online interactive gambling in 2014 led to a small increase in overall participation in online interactive gambling (from 0.7% in 2005-07 and 1.6% in 2008-13 to 5.6% in 2014-18).								
Erwin, Pacheco, and Turcu (2021)	New Zealand	NA: Administrative data	NA	NA	NA	NA	Quasi-experimental + secondary analysis		To estimate the effect of sinking lid policy (gradually reducing EGM caps by prohibiting the transfer of gaming licenses) on gambling expenditure.
	Main findings: Examined effect of sinking lid policies used by local areas (TAs) compared to (a) absolute EGM caps, (b) per capita caps or (c) reference groups (TAs with no additional restrictions beyond national Gambling Act). Per capita caps and sinking lids were most effective. Compared to the reference group, either of these policy interventions had a cumulative impact of reducing EGM spending by an estimated 13–14%, while absolute caps reduced overall gambling expenditure by 10%.								
Finkenwirth, MacDonald, Deng, Lesch, and Clark (2021)	Canada	NA: Gambling site data	Gamblers	19683	NA	NA	Secondary analysis	3	To test the ability of machine learning to identify at-risk online gamblers.
	Main findings: Machine learning (using the random forest classifier and 20 input variables reflecting multiple aspects of gambling frequency, intensity, and variability) achieved an Area Under the Receiver Operating Characteristic curve (AUROC) of 0.75 (SD = 0.01). Across all models, machine learning algorithms were able to predict self-exclusion status with performance between 0.65 and 0.76, using behavioural inputs (with ever having enrolled in self-exclusion being a proxy for existence of gambling problems).								
Forrest et al. (2021)	UK	NA: Data provided by online gambling sites	NA	NA	NA	NA	Secondary analysis	3	Examine (as part of a broader study) operator interventions, specifically social responsibility contacts, made to gamblers whose pattern of gambling has been identified as of concern.
	Main findings: Social responsibility contacts were made to 3.9% of customers whose pattern of gambling gave cause for concern. The vast majority (84%) of contacts were by email. A small percentage of customers were contacted by telephone (0.13% of customers, generally indicating escalation of contact). Metrics indicate a pattern of significant reductions in number of bets placed and spending (losses) in the month after an intervention telephone call.								
Forsström, Rozental, Wiklund, Carlbring, and Lindner (2021)	Norway	Gambling site	Gamblers	757	Range: 20-87; M: 49.4; SD: 13.1	79%	Mixed methods	4	To explore gamblers' perception of their risk assessment for problem gambling using a self-assessment tool embedded within Playscan (precommitment system).
	Main findings: Qualitative evaluation of comments from Playscan users revealed a key theme whereby users were positive or negative in their assessments, with some participants pleased with the risk assessment, suggesting it would be helpful to those who needed it, while others were critical of								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
	the risk assessment and/or their results and/or Playscan. Quantitative analyses showed that participants at risk of developing gambling problems reported lower agreement with the risk assessment, lower general assessment of the Playscan, and were more likely to express negative-themed comments compared to those not at risk.								
Gainsbury, Abarbanel, and Blaszczynski (2020)	Australia	Online panels	Gamblers	501	Range: 18-83; M: 45.5; SD: 14.8 (Male); M: 38.1; SD: 12.7 (female)	68%	Cross-sectional	2	(1) To identify which online bettors are most likely to engage in in-play betting. (2) To investigate the relationship between in-play betting and gambling problems.
	Main findings: Found 34% of participants had placed an in-play bet in the past month. Those placing in-play bets differed significantly from those who had not in terms of demographics (higher education; employed full time; not on welfare; ethnicity [of Asian or Middle Eastern backgrounds and not from European backgrounds]; younger age) and in terms of gambling involvement. In-play bettors reported significantly higher problem gambling severity scores than those who did not bet in-play and problem gambling severity significantly predicted in-play betting, holding other variables constant.								
Gainsbury, Philander, and Grattan (2020), study 1	USA	Gambling site/s	Gamblers	43	Range: 31-74; M: 53.3; SD: 11.9	44%	Cross-sectional	2	To use the theory of reasoned action (TRA) to investigate factors that motivate intentions to play hybrid gambling machines (HGM)s, specifically whether casino gamblers' attitudes and social norms are positively related to gamblers' intention to gamble on HGMs.
	Main findings: Examined gambling intention in casino gamblers who had received guided demonstrations of HGMs in-situ (ie casino). Raw corrections showed both the attitude scale, and the subjective norm scale were significantly positively correlated with intention to gamble (on HGMs), i.e., positive attitudes and stronger subjective norms towards HGMs are related to a positive intention to gamble on HGMs.								
Gainsbury, Philander et al. (2020), study 2	USA	Online panels	General population	184	Range: NR; M: 34.0; SD: 9.3	68%	Cross-sectional	2	To use the theory of reasoned action (TRA) to investigate factors that motivate intentions to play hybrid gambling machines (HGM)s, specifically whether casino gamblers' attitudes and social norms are positively related to gamblers' intention to gamble on HGMs.
	Main findings: Used SEM to test a model of prediction for HGMs and EGMs. Both attitudes and subjective norms significantly predict intentions to gamble on HGMs with SEM measures showing overall good model fit; more positive attitudes and stronger subjective norms towards HGMs predicted a stronger intention to gamble on HGMs within the next year. Similarly, attitudes and subjective norms significantly predict intention to gamble on EGMs, with similar effect sizes as the HGM model but the overall model had slightly less support, with measures of model fit being mixed.								
Gainsbury et al. (2021)	Australia	General population (convenience)	Gamblers	764	Range: 18-82; M: 43.8; SD: 14.8	85%	Cross-sectional	5	To investigate the impact of the shutdown of gambling venues due COVID-19 restrictions on Australians.

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
	Main findings: Almost 80% of respondents reported decreased overall gambling frequency from baseline to shut down and 55% reported decreased online gambling. Higher levels of problem gambling severity were not related to increases in gambling although over half of the minority who reported increased gambling were classified as either moderate-risk or problem gambling.								
Glassford, Wilson, and Gupta (2020)	USA	General population (convenience)	Gamblers	4	Range: 19-61; M: 33.5; SD: NR	50%	Cross-sectional	2	To explore the extent to which knowledge of rules (re likelihood of winning) altered participants' engagement in risky betting in an electronic blackjack game.
	Main findings: A multiple-baseline across-participants design with predetermined phase changes was used to assess four recreational gamblers' betting patterns in blackjack across 3 phases in terms of the likelihood of winning using let-it-ride bets (no rules, faulty rules and correct rules). The study found frequency of risky bets using let-it-ride increased for all participants when exposed to the incorrect rule and decreased in 3 out of 4 participants following exposure to correct rules. However, most participants did not return to baseline rates of risky betting.								
Gray, Juliver, and LaPlante (2021)	USA	gambling venue	Industry representatives	492	NR	51%	Cross-sectional	4	To explore gambling venue employees' experiences with "GameSense" an onsite responsible gambling information centre designed to be a resource for both casino employees and patrons.
	Main findings: Found that only a minority of participants (33.5%) had spoken with a GameSense Advisor about responsible gambling or problem gambling, with interactions more likely to have occurred in security/surveillance and back-of house staff. Almost all participants (88.9%) were aware casino patrons could use the program, but only around a third knew that casino staff/employees could. Participants generally had positive opinions about the program but gambling venue employees with more extensive gambling histories were less likely to endorse positive potential impacts of the program.								
Graydon et al. (2021), Study 1	NA	NA	NA	NA	NA	NA	Literature review	2	To analyse experienced EGM gamblers' win-overestimates from relevant studies examining different loss disguised as wins (LDW) percentages to determine if/what the optimal percentage of LDW may be to trigger win-overestimations.
	Main findings: Combined data from literature review showed an inverted U-shaped function for LDW win-overestimates such that a moderate number of LDWs (between 15-25% of total spins) maximizes win-overestimation effect, while a high number of LDWs decreases the effect.								
Graydon et al., (2021), Study 2	Canada	General population (convenience)	Gamblers	126	Range: 19-89; M: 60; SD: 14	60%	Experiment	2	To test whether there is an inverse U shape relationship between number of loses disguised as win (LDWs) and LDW-triggered win-overestimations (using calculations from related study 1).
	Main findings: Tested the theory developed in Study 1 that a moderate number of LDWs (between 15-25%) would maximise the win-overestimation effect of LDW by setting frequency of LDW at 19.6%. Results showed participants overestimated wins, on average, by around 96.33%.								
Guillou-Landreat et al. (2021)	NA	NA	NA	NA	NA	NA	Systematic review	1	To conduct a systematic literature review of digital gambling marketing to answer the following questions: (1) What are the strategies of digital gambling marketing? (2) What is the effect of this exposure on

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
									gambling representations, intentions and practices?
	# of included studies: k=21 studies; Years covered: 2000-February 2020; Study design: quantitative or qualitative study designs. Participant type: No participant type described. Main findings: Found that (a) sport was a clear target of online gambling marketing with an increasing range of platforms to access online sport betting and the development of digital marketing strategies and social media to promote sports betting and normalise gambling on sports, (b) digital gambling marketing strategies were gendered and predominantly targeted young men, and (c) digital gambling marketing strategies were focused on vulnerable populations such as young people and those at risk of or experiencing gambling problems.								
Hayer, Brosowski, and Meyer (2020)	Germany	NA: administrative and observation data	Gamblers and Mystery Shoppers (Observers)	12,253 exclusion entries 8 observers	Self-excluders: Range 18+; M=33.85; SD=NR Mystery shoppers: 22-42 years; M=26.5; SD NR	Self-excluders 88% Mystery shoppers 100%	Mixed methods	6	(1) quantitatively analyse the administrative data set of all excluded individuals in the multi-venue OASIS system compared to clients of outpatient addiction support programs and (2) examine staff compliance in implementing various gambler protection measures, including active self-exclusion.
	Main findings: In total 99% of the OASIS cohort were self-excluders. Comparisons between the OASIS cohort and those accessing counselling showed that women were more likely to use OASIS than counselling and that the OASIS cohort were, on average, more likely to be younger and migrants than those in counselling. Compliance checks by mystery shoppers found that no entry checks were conducted in 14% of cases and that they were able to gamble despite an active self-exclusion in 28% of gambling venues. In addition, staff reacted with appropriate interventions to signs of problematic gambling behaviour in only 7% of cases.								
Heirene and Gainsbury (2021)	Australia	Gambling sites	Gamblers	25560	NR	NR	RCT	4	(1)To test the effectiveness of different messages and delivery mode on take up of limit-setting on gambling sites, (2) to examine the effects of limit-setting on gambling behaviour.
	Main findings: A 3 (message type) × 2 (delivery mode) plus control design. Findings showed that gamblers who were sent messages were more likely to set deposit limits (0.71%) within five days of receiving the message than the control group who were not (0.08%), however, contrary to hypotheses, social and personal messages were no more effective than informative messages and in account messages no more effective than emails. Further, limit setters who were low-mid range bettors significantly decreased the amount wagered, net losses and betting intensity compared to non-limit setters.								
Houghton and Moss (2020)	UK	General population (convenience)	Gamblers	100	Range: 18-64; M: 27.84; SD = 9.01	83%	Cross-sectional	1	(1) To assess whether sports bettors' response to gambling advertising on social media differs depending on whether the bet was advertised by a gambling operator or gambling affiliate, and (2) whether this relationship differs depending upon bet complexity.

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
	Main findings: A 3 x 2 repeated measures designed was used with regular football betters presented with bets differing in complexity (low, medium and high) and presented separately on both an operator account and an affiliate account. (1) significant main effects such that participants were significantly less confident, less likely to bet and would spend less money on high complexity bets than medium complexity bets and on medium complexity bets than low complexity bet and were more likely to bet and be more confidence to bet when they were presented on an affiliate account than an operator. (2) A significant interaction between bet complexity and account type showed bettors rating themselves as more likely to bet and more confident in bets presented on an affiliate account for medium complexity bets but not for low or high complexity bets.								
Ipsos MORI (2020)	UK	General population (representative) & General population (convenience)	General population	Survey: k=676 11-17 year olds, k=394 18-24 year olds, k=21 not reported Qualitative interviews k=28 11-24 year olds; k=32 vulnerable adults	Survey: Range: 11-24; M=NR; SD=NR; Qualitative interviews: NR	Survey: 46% Qualitative interviews: 11-24yo 39%; Vulnerable adults 56%	mixed methods	1	To examine the effects of gambling marketing and advertising on children, young people and vulnerable adults based in the UK.
	Main findings: Combining findings from all aspects of the study the study found a variety of advertising features attracted young people and vulnerable adults (e.g, celebrity endorsement, humour, winners) and specific features that could exploit these groups (e.g., implying limited risk or that gambling is simple). Exposure to gambling was high in young people; it increased awareness of gambling and was associated with likelihood of future gambling for those not yet gambling. Those who experienced a greater level of exposure to adverts, who engaged with marketing activities from gambling operators, and who had a high level of brand awareness were more likely to say they would gamble in the future. Factors significantly associated with current gambling included peer gambling, engagement with marketing activities from gambling operators, brand awareness, parental gambling and age, with peer gambling having the strongest association.								
Ipsos MORI Public Affairs (2020)	UK	Industry Operators, Targeted sampling, General population (broadly representative), General population (convenience)	Industry representatives; General population; Gamblers; & Users of the self-exclusion schemes	6 Scheme operators; 2 treatment providers; 2 academics; 14 frontline staff; 19 compliance officers; 1,500 survey participants;	Survey: Range 18+; M=NR; SD=NR Qualitative interviews: Range 18+;	Survey: 50% Qualitative interviews: 71.4% Other groups: NR	Mixed methods	6	(1) To explore to what extent land-based multiple-operator self-exclusion schemes have led to the desired changes in levels of awareness and to explore perceptions and delivery arrangements of the schemes, (2) to highlight any unanticipated barriers to the achievement of the self-exclusion objectives that might form the focus of future policy improvements.

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
		& Database of self-exclusion schemes		5 online focus groups (numbers NR); 42 Qualitative interviewees	M=NR; SD=NR Other groups: NR				
	Main findings: Findings from Phase 1 of the evaluation of land based Multi-Operator Self-Exclusion Schemes (the baseline) suggest that there is low awareness of the scheme in those who need it and little evidence of cross-promotion of different schemes and some evidence of operators not encouraging use of the schemes. Identification of individuals trying to breach their self-exclusion agreement works well when an individual is required to provide membership details before they can gamble but there was widespread evidence of people breaching VSW where identification is not required. There was some evidence of effect for the small number of people who had used them with the majority (69%) having stopped or reduced their gambling. Improvements are required in terms of staff training, communication/promotion of the scheme and in terms of processes to smooth friction and increase user understanding.								
C. Jacob et al. (2021)	UK	Gambling sites	Gamblers	NR	NR	NR	Mixed methods (RCT & pre/post)	4	To evaluate the effectiveness and impact of a range of interventions developed and piloted by online and offline gambling operators as part of a Safer Gambling Messaging program.
	Main findings: In terms of encouraging uptake, direct messaging interventions (e.g., emails, SMS) were generally ineffective in increasing the proportion of customers using consumer protection tools (e.g., deposit limits, session time reminders). A revised sign-up process aimed at directly reducing friction and increasing salience of safer gambling tools significantly increased the proportion of new customers choosing to set deposit limits (10.3% vs 1.0%) compared to a control group, however, an evaluation of pop-up reminders to set a deposit limit sent a group of 2,617 current online wagerers did not significantly improve uptake of deposit limits compared to a control group of 9,836 customers who did not receive a pop-up reminder. Pre/post evaluations found a large increase in gamblers enabling consumer protection tools following reminders (781 customers [out of 39,091] enabled session reminders vs typical uptake of <10 customers per week) or social media advertising campaigns (280 enabling a “reality check” feature in a month vs typical single digits). Evaluations found that none of the interventions impacted on subsequent gambling behaviour such as total amount deposited or total play time.								
Killick and Griffiths (2020)	UK	General population (convenience)	Gamblers	19	Range: 21-32; M: 25.5; SD: 3.25	89%	Qualitative	1	To explore (1) the attitudes and opinions of sports bettors in response to marketing techniques used by the gambling industry and (2), the perceived impact advertising has on their sports betting behaviour.
	Main findings: Three themes and associated sub-themes emerged (i) temptation to gamble (enticement to gamble and unavoidable nature of advertisements), (ii) promotion characteristics of gambling (attractive odds, brand awareness and normalisation of betting), and (iii) regulating gambling advertising: [lack of effective] responsible gambling messages, [need to] protect children and industry comparisons.								
Kristiansen and Severin-Nielsen (2021)	Denmark	General population (representative)	Youth	1137	Range: 12-16; M=13.9; SD=NR	50%	Cross-sectional	1	To examine gambling advertising awareness among adolescents, including their perceptions of the impact of gambling advertisements, and relationships between awareness of

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
									advertising and adolescents' gambling behaviour.
	Main findings: The study found a high exposure to gambling advertising with males reporting significantly higher exposure to daily advertising than females. Self-perceived impact of these advertisements was relatively low, but self-perceived impact of gambling advertising was associated with gambling expenditure and at-risk or a problematic gambling.								
Labrador et al. (2021)	Spain	General population (representative)	General population	2887	Range: 12-22; M:15.35; SD: 2.69	Just over half	Cross-sectional	1	To study the effect of advertising on attitudes and gaming behaviour.
	Main findings: Results showed only a weak effect of advertising, with most reporting that advertising does not influence them, however a minority (11%) of adolescents and young adults do report being influenced by advertising, with 5% reporting being severely affected. Gender differences were found with men seeing themselves more impacted than women.								
Lakew (2021)	Sweden	Payment gateway account operator	Gamblers	10	NR	NR	Qualitative	4	To examine the outcomes of an implementation, at the payment-solution level, of a precommitment tool that allows gambling customers to use a single point to set deposit limits across gambling providers, effectively enabling them to apply their budget setting on all gambling platforms on which they choose to play.
	Main findings: Qualitative interviews with gamblers who had used the system for 6+ months across at least two different gambling platforms were analysed finding that gamblers used the tool to support overall gambling budgeting, increase financial literacy, reduce gambling and/or as a safety measure to control spending. Participants found the tool easy to use and recommended some improvements such as a spending report, ability to change limits, and increased options for budget setting.								
Lischer, Steffen, Schwarz, and Mathys (2021)	Switzer-land	Ongoing longitudinal sample of gamblers	Gamblers	110	NR	77%	Cross-sectional	5	To examine the impact of COVID-19 related venue closures on gambling behaviour, in particular changes in self-reported gambling by Swiss, land-based casino players.
	Main findings: 55% of respondents gambled during lockdown. Gambling intensity significantly decreased overall and in the sample who gambled during lockdown, but online gambling significantly increased in this group.								
Lopez-Gonzalez, Griffiths, and Estevez (2020)	Spain	Online panels	Gamblers	659	Range: 18-66; M:35.1; SD 10.1	74%	Cross-sectional	2	To explore the relationship between in-play betting and gambling problems.
	Main findings: The study found that in-play bettors reported higher problem gambling severity and consumption of junk food and/or alcohol while watching sport compared to those not placing in-play bets.								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
Lugo et al. (2021)	Italy	General population (representative)	General population	6003	Range: 18-74; M:NR; SD: NR	49%	Cross-sectional	5	To evaluate short-term effects of COVID-19 related lockdown restrictions on gambling behaviours in Italy.
	Main findings: Prevalence of gambling decreased from 16.3% prior to 9.7% during lockdown. Land-based gambling decreased from 9.9% pre-lockdown to 2.4% during lockdown, and online gambling decreased slightly from 9.9% pre-lockdown to 8.0% during lockdown. Almost half ever gamblers gave up completely during lockdown (44%) with only 1% taking up gambling. Among gamblers, 72% reported an improvement in gambling activity and 19.7% increased gambling activity with a median gambling time increase overall in gamblers from 4.5 hours/month to 5.1.								
McAuliffe et al. (2021)	NA	NA	NA	NA	NA	NA	Scoping Review	2, 4, 5	to conduct a systematic mapping of evaluations of tools and interventions that are intended to mitigate risks for gambling harm.
	# of included studies k=86 studies published in 78 articles; Years covered: 2001-2020. Study design: Included studies that described a quantitative empirical assessment of a game-based structural feature, user-directed tool, or regulatory initiative to promote responsible gambling. Participant type: No participant type described. Main findings: Findings were mixed for all features, tools and initiatives with the most consistent evidence supporting beneficial outcomes from enforced breaks-in-play and pop-up messages.								
Meng & Leary (2021), study 1	USA	Online panel	General population	187	Range: NR; M:35.48; SD:11.41	48%	RCT	2	To establish that the presence of skeuomorphic design elements (where an aspect of a modern item is manipulated to represent its outdated counterpart, eg electronic hands “dealing” cards) in a gambling game increases the amount gambled while experimentally ruling out four other potential explanatory variables - familiarity, entertainment, affect, and activity.
	Main findings: Results showed that participants playing the skeuomorphic game indicated an intention to gamble a significantly greater amount compared to those playing the flat design game. Further, despite participants in the Skeuomorph condition giving higher ratings on familiarity of game and potential entertainment compared to those in the flat design condition, none of the four factors (familiarity, entertainment, activity or positive affect) significantly mediated the direct effect of game design on betting intention.								
Meng & Leary (2020), study 2	USA	Online panel	General population	299	Range NR; M:36.79; SD:11.27	53%	RCT	2	Following Study 1, to directly manipulate the illusion of control and test its relationship with the design of the gambling device (skeuomorphic vs flat design).
	Main findings: The study employed a 2 x 2 design that varied (1) interface (skeuomorph) with participants guessing a number between 1-6 with or without a die, and (2) illusion of control with participants being either always successful or always wrong in a series of trials. Participants then estimated the chance they thought they had of winning the final round. Results revealed that those in the skeuomorph and success conditions displayed higher levels of illusion of control and that there was a significant interaction such that, for those in the success condition, participants playing a skeuomorphic game considered themselves to have a significantly higher chance of winning the final round compared to those who played the flat design game.								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
Meng & Leary (2020), study 3	USA	Online panel	General population	160	Range: NR; M:35.26; SD:12.32	51%	RCT	2	Extend study 2 by examining whether the combined effect of skeuomorphism and illusion of control on gambling behaviour will be dampened when players are unable to choose their own numbers (ie removing illusion of control).
	Main findings: The study employed a 2 x 2 between-subjects design involving a randomly generated number between 1-6. All participants were explicitly told that the results would be randomly generated using an algorithm. They were randomly assigned to see either a die or a '?' (skeuomorphic vs flat interface) and a choice /randomly assigned number condition (manipulating illusion of control) and asked to bet some or all of $0.25 they had previously "earned" with the potential to win four times the amount bet. Results showed a marginally significant interaction such that for those in the choice condition, participants who played the skeuomorphic game bet a significantly greater amount compared to those who played the flat design game.								
Park, Choi, Kim, Boots, and Lee (2021)	Sth Korea	NA: Data provided by gambling venues	NA	NA	NA	NA	Secondary analysis of longitudinal data	4	To examine how mandatory electronic players' card (EPC) systems adopted into specific Korean horse and cycling venues compare to other venues operating voluntary, autonomous EPC systems in terms of impacts on impact gambling behaviours, revenues, and policies.
	Main findings: Overall, cash bets predominated across venue types for both horse and cycle betting, but electronic cards (EPCs) were more widely used in mandatory EPC venues for horse betting and in autonomous venues for cycling betting. Significantly larger bets were placed, on average at both horse- and cycle-betting venues with autonomous card registration versus mandatory venues. Findings over time suggested that the EPC system may be reducing betting behaviours in horse betting (across both venue types) but this reduction was not observed for cycle betting.								
Parrado-Gonzalez and Leon-Jariego (2020)	Spain	Schools	Youth and young adults	1174	Range:12-20; M:15.86; SD:1.78	53.60%	Cross-sectional	1	To use SEM to (1) test direct and indirect (via attitudes and normalisation) relationships between exposure to gambling advertising and gambling frequency and (2) whether these relationships are moderated by family support.
	Main findings: The majority of the effect of exposure to gambling advertising on gambling frequency was mediated by attitudes and descriptive norms. Gambling frequency was strongly related to problem gambling. Tests of the moderating effect of family support showed that, for adolescents with high family support, exposure to gambling advertising did not promote favourable attitudes towards gambling and gambling frequency had less effect on problem gambling.								
Peres et al. (2021)	Portugal	NA: Gambling site data provided by regulator	NA	NA	NA	NA	Secondary analysis	3	To use time series clustering algorithms and online betting data from sports betters and blackjack gamblers to identify behaviours associated with potential pathological gamblers.
	Main findings: (1) Sports bettors: Identified 4 clusters. Clusters 0 and 3 identified as including at-risk gamblers, with both betting much more money than the other two clusters and cluster 0 likely to contain high risk 'pathological gamblers' as they also lost more money and were more likely to have a								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
	negative balance. (2) Black jack gamblers: Identified 4 clusters. Clusters 2 and 3 identified as including at-risk gamblers with both clusters betting more money than the other 2 clusters and cluster 3 likely to contain high risk 'pathological gamblers' as they also lost more money, had higher maximum bets and were more likely to have a negative balance.								
Pickering and Blaszczynski (2021)	Australia	Self-excluders (convenience)	Gamblers	85	Range: 41-45; M:51.10; SD=11.67 (females); M: 44.34; SD=11.67 (males)	72%	Cross-sectional	6	To conduct a process and impact evaluation to understand consumers perspectives regarding processes and support at the end of self-exclusion agreements and to identify factors differentiating those who renew or discontinue self-exclusion.
	Main findings: Participants found processes straight-forward but the majority did not feel adequately informed at the time about processes to re-enrol or exit, and this was particularly the case for those choosing to discontinue self-exclusion. The top processes participants recommended be in place at termination of self-exclusion were the ability to re-enrol quickly and easily, an option for permanent exclusion, and a structured 'safety plan' for those returning to venues. No significant differences were observed between the groups on demographics, gambling, help-seeking, problem gambling severity, gambling urges, self-efficacy, psychological distress or quality of life.								
Pickering et al. (2021) a	Australia	Phase 1: Targeted sampling Phase 2: Self-exclusion database Phase 3: Self-exclusion database	Ph 1: Self-exclusion consumers, counsellors, venue staff, policy makers Ph 2: Self-exclusion consumers Ph 3: Self-exclusion consumers	Ph 1: 5 consumers, 7 counsellor, 6 venue staff, 7 policy makers Ph 2: 10 Ph 3: 20	Ph1: Range 18+; M=38; SD=NR Ph2: Range 18+; M=36; SD=NR Ph3: Range 18+; M=46; SD=11	Ph1: 48% Ph2: 80% Ph3: 40%	Mixed methods	6	To pilot an online self-exclusion pathway designed to streamline the ease of registration processes and overcome known barriers with the objective of increasing self-exclusion uptake
	Main findings: A mixed methods design was used to (a) identify key design and functional requirements for a self-exclusion website, (b) evaluate ease of use to complete self-exclusion registration, and (c) evaluate approval of and intention to use such a system. Key website attributes identified included simplicity in design, a credible and trustworthy environment (secure and trustworthy), and an ability to accommodate individual user needs. Usability evaluation found good overall system usability (score of 84 out of 100 indicating highly usable) and overall positive responses. Acceptability evaluation found very strong acceptability (lower for perceived security) and strong likelihood to use site.								
Pisklak, Yong, and Spetch (2020)	USA	Universities	General population	178	Range: NR M:NR SD: NR	36%	RCT	2	To conduct an experiment to assess the near-miss effect on the frequency of the gambling response.
	Main findings: Evaluated the putative reinforcing effect of near misses relative to a control "far-miss" reel pattern under lab conditions using a simulated reel in a 2 (reel design) x 2 (treatment: near vs far miss). Results failed to support the near-miss effect hypothesis with no significant differences for main effects or the interaction.								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
Responsible Gambling Council (2020)	Canada	General population (representative)	Gamblers	2005	Range: 18-89; M: 48; SD: NR	50%	Cross-sectional	5	To understand the effects of the COVID-19 pandemic restrictions on in-person gambling facilities on Ontarian gamblers.
	Main findings: The vast majority (76.7%) of respondents were in-person or land-based gamblers only (past 12 months), 13.6% were a mix of in-person and online gamblers, and 9.7% online only. Approximately 54% (n=1081) had gambled online in the six weeks following venue closures. Approximately one-third of these said this was, in part, influenced by COVID-19 and the impact of emergency measures, which included greater isolation.								
Roderique-Davies, Torrance, Bhairon, Cousins, and John (2020)	UK	Universities	Gamblers	60	Range: 18+; M: 22.67; SD:4.01	58.30%	RCT	1	(1) To investigate whether exposure to embedded gambling promotions during televised football, elicits urges to gamble amongst students, and (2) whether gambling problems are more prevalent in students who study sports-related subjects compared to those who do not.
	Main findings: A 2 (sports/non-sports students) x 3 (promotion condition) RCT with 2 experimental conditions (a) televised football match highlights with a high density of embedded promotion; or (b) amateur football match highlights containing no gambling-related cues or embedded promotion or (c) a neutral control video containing footage of a live concert. Sports-students reported significantly higher scores on a gambling problems measure than non-sports students. There were significant main effects for urges to gamble and promotion conditions and a significant interaction. Sport-students exposed to embedded gambling promotion in a sports video reported significantly higher urges to gamble compared to all other conditions. Similarly, sports-students exposed to an amateur match containing no gambling-related material experienced higher urges to gamble than controls but this relationship was not seen for non-sports students.								
Scarfe, Stange, and Dixon (2021), study 1	Canada	Universities	Gamblers	73	Range: 19 34; M:20.8; SD:2.25	37%	Experiment	2	To explore the effects of a negative (rather than positive) sound accompanying losses disguised as wins (LDW) on player behaviour and experience.
	Main findings: A realistic EGM simulator and within-subjects condition tested responses to (a) a standard positive sound condition (LDWs paired with positive sound, losses paired with silence), and (b) a negative sound condition (LDWs and losses paired with negative sound) finding that participants responded to LDWs in a more loss-like and less win-like fashion in the negative sound condition as measured by post-reinforcement pauses (PRPs). Win estimates were reduced and subjective experience was significantly impacted when the negative sound condition was played second.								
Scarfe et al (2021), study 2	Canada	Universities	Gamblers	70	Range: 19-25; M:20.8; SD 1.48	41%	Experiment	2	To explore the effects of a negative (rather than positive) sound accompanying losses disguised as wins (LDW) on player behaviour and experience.
	Main findings: Following on from Experiment 1, a realistic EGM and within-subjects condition tested responses to (a) a standard positive sound condition (LDWs paired with positive sound, losses paired with silence), and (b) a negative sound condition (LDWs paired with a negative sound, losses paired with silence [rather than a negative sound]). Found similar effects with participants responding to LDWs in a more win-like fashion in the positive sound condition and responding according to outcome and in a more loss-like condition to LDW in the negative sound condition as measured by post-								

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
	reinforcement pauses (PRPs). Again, win estimates were reduced and subjective experience was significantly impacted when the negative sound condition was played second.								
Škařupová et al. (2020)	NA	NA	NA	NA	NA	NA	Systematic review	3, 4, 6	To examine online and offline gambling venue strategies designed to identify and address gambling problem plus assess the effectiveness and strength of the evidence.
	# of included studies k=67; Years covered: 2000-September 2015; Study design: Any study containing a systematic description of either in situ identification of problem gamblers or in situ intervention for problem gambling, or, a comprehensive system of such measures; Participant type: No participant type described. Main findings: Some evidence of effect for a range of measures including dynamic and personalised messaging, gambling behaviour surveillance, some precommitment systems and self-exclusion.								
Stange and Dixon (2020)	Canada	Universities	Gamblers	138	Range NR; M: 20.48; SD: 1.95	20%	RCT	2	(1) To investigate the influence of a near-miss on subsequent gambling urges and behaviour using instant scratch cards and offers to "cash out" or risk winnings to purchase another card following a loss or near miss; (2) To test whether illusion of control influences the decision to purchase additional scratch cards over and above near-miss effects.
	Main findings: All participants received two custom-made scratch cards with a win on the first card and either a regular loss or a near-miss in the final outcome position on the second card (between-subjects manipulation). Near-miss outcomes increased urge to continue gambling (relative to those receiving a regular loss), but there were no significant differences between groups in rates of subsequent purchasing. Additionally, illusion of control had no impact on purchasing decisions in the near-miss condition.								
Syvertsen, Pallesen, Erevik, and Mentzoni (2020)	Norway	Clinical (gambling)	Gamblers	5 current gambling disorder, 7 Lifetime gambling disorder	Range 29-55; M: 41; SD: 7.76	83%	Qualitative	1	To examine direct gambling marketing experiences among 12 individuals with either current or lifetime gambling disorder.
	Main findings: Two overarching themes and associated subthemes were identified. (1) Types of direct marketing received and relationship to gambling behaviours - with some promotions experienced as personal (dependent on engagement, special treatment) while others were experienced as mass produced (common bonuses, free spins). (2) Psychological distance to gambling determined direct marketing experiences - with participants' attitudes toward direct marketing varying as a function of gambling engagement such that, during periods of active gambling, direct marketing was experienced as beneficial and positive while, when attempting to reduce/abstain from gambling, participants experienced direct marketing as aggressive and predatory. Direct marketing was experienced as a trigger for gambling urges and was reported to induce a conflict between gambling and abstinence.								
Syvertsen et al. (2021)	Norway	General population (representative)	Gamblers	5830	Range: 16-74; M:44.27; SD: 15.89	52%	Cross-sectional	1	To examine (1) whether problem gambling was associated with self-perceived advertising impact or exposure type and (2) whether advertising

Study ID (author, year)	Country of publn	Recruitment source	Type of sample	Sample size	Age (range, M, SD)	Gender (% male)	Study design	Sub-theme	Study aims
									exposure was associated with advertising impact.
	Main findings: Study found that problem gambling was associated with increased self-perceptions of advertising impact on gambling involvement and awareness of gambling. There was also a positive association between exposure to direct advertising and problem gambling. Internet advertising was the strongest predictor of perceived advertising impact on gambling involvement while TV advertising was the strongest predictor of advertising impact on knowledge of gambling forms and operators and awareness of gambling.								
Turner, Shi, Robinson, McAvoy, and Sanchez (2021)	Canada	self-exclusion operator	Gamblers	235	Range: 18+; M: NR; SD: NR	59%	Longitudinal	6	To determine the efficacy of a tutorial created with the intent of reducing the risk of harm to self-exclusion participants who reinstate gambling.
	Main findings: Compared a control group of people who reinstated gambling in the year prior to the implementation to an experimental intervention group who reinstated after the implementation of the online tutorial. Study found a significant decrease in gambling and problem gambling comparing pre-exclusion to during exclusion for both groups and this drop in gambling problem was sustained for 6-months and 12-months after reinstatement. However, no significant main effect or interaction was found to support the efficacy of the tutorial over and above the effects of self-exclusion.								
Yakovenko and Hodgins (2021)	Canada	self-exclusion participants	Gamblers	201	Range NR; M: 41.84, SD:13.23	59%	RCT	6	To evaluate participation in a new online intervention designed to support self-exclusion, specifically to compare the online intervention to the existing face-to-face support program to establish relative effectiveness using an accessible and theory-driven alternative.
	Main findings: Participants were randomly assigned to one of the two programs when registering for self-exclusion (a) a face-to-face workshop or (b) online self-management program, and followed up at 3, 6 and 12 months. Results showed that participants in both groups experienced reductions in problem severity and in time (days) and money spent gambling plus a decreased need for formal treatment over time. There were no significant differences between the two groups on any of the primary or secondary outcomes.								

Footnotes:
Subtheme 1: Marketing of gambling products; Subtheme 2: Product characteristics and bet types; Subtheme 3: Staff training programs and/or host responsibility (RSG); Subtheme 4: Consumer protection/responsible gambling tools and strategies; Subtheme 5: Geographic and time-based accessibility to gambling; Subtheme 6: Self-exclusion

a – this report was not identified within the systematic search but was included on request from NSW ORG.

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9. Appendices

Appendix A: Themes and Associated Subthemes

Gambling Prevalence and Harm
- Prevalence of gambling participation, problems and harm in large-scale general population-representative surveys of adults
- Risk and protective factors and transitions between levels of risk in longitudinal studies of adults
- Psychometric properties of new and existing instruments for measuring gambling problems and harms
- Measurement of harms

Individual and Community-level Prevention and Early Intervention
- Prevention
- Early Intervention
- Self-Management

Efficacy and Effectiveness of Treatment
- Which treatments work
- For whom does treatment work
- How and why do treatments work
- Professional help-seeking preferences
- Motivators and barriers for seeking treatment
- Effectiveness of Screening, Brief Intervention and Referral to Treatment (SBIRT)

Gambling among Vulnerable Groups
- Youth
- Young adults
- CALD and Indigenous
- Family Violence
- Homelessness

Emerging Technologies and New Trends
- Emerging technological gambling features and activities
- The relationship between gambling and gaming
- Emerging technologies and trends in payment methods

Gambling industry products, practices, environments and regulation
- Marketing of gambling products
- Product characteristics and bet types
- Staff training and host responsibility
- Consumer protection and responsible gambling tools/strategies
- Geographic and time-based accessibility to gambling
- Self-exclusion

Appendix B – Search strategies

B1 – Electronic database search strategies by search

Search 1: Gambling prevalence and harm
#1 gambl* OR betting OR wager
#2 population OR prevalence OR incidence OR longitudinal OR prospective OR cohort
#3 #1 AND #2

Search 2: Individual and community level prevention and early intervention
#1 gambl* OR wager* OR betting
#2 prevent* OR school OR educati* OR train* OR workshop OR university OR program*
#3 interven* OR screening OR "limit setting" OR "limit setting" OR “setting limit*” OR “personalised feedback” OR “normative feedback” OR “social norms”
#4 “self-help” OR “self help” OR “self-management” OR “self management” OR “self-directed” OR “self directed”
#5 #2 OR #3 OR #4
#6 #1 AND #5

Search 3: Efficacy and effectiveness of treatment
#1 gambl* OR betting OR wager
#2 treat* OR therap* OR trial* OR intervention* OR help*
#3 outcome* OR efficac* OR effective* OR attrition OR dropout OR engagement OR predict* OR moderat* OR mediat* OR process* OR mechanis* OR prefer* OR choice* OR select* motivat* OR enabl* OR reason* OR facilitat* OR barrier* OR enabler* OR obstacle*
#4 #1 AND #2 AND #3

Search 4: Emerging technologies and new trends
#1 gambl* OR betting OR wager*
#2 emerging OR trend*
#3 skin* OR “skin* lotter*” esport* OR e-sport* OR “electronic sport*” OR “esport spectat*” OR “e-sport spectat*” OR “electronic sport spectat” OR “competitive gam*” OR “skill*-based” OR “skill* based” OR “skill*-related” OR skill* OR "loot box*" OR "loot crate*" OR "loot prize*" OR "lock box*" OR "prize box*" OR "mystery box*" OR chest* OR prize* OR treasure* OR simulated OR "gambling-like" OR "gambling-like practice*" OR "gambling-like activit*" OR "gambling-like behav*" or "gambling-like experienc*" OR “social casino” OR “demo” or “practice game*”
#4 "video gam*" OR videogam* OR "internet gam*" OR "online gam*" OR "online gaming* addiction*" OR "internet gaming* addiction*" OR "internet gaming disorder*" OR "problem* internet use" OR "gaming disorder*" OR "video gaming disorder*" OR "videogaming disorder*" OR "gaming addiction*" OR "videogaming addiction*" OR "disordered gaming" OR "disordered video gaming" OR "disordered videogaming" OR "problem* gaming" OR "problem* video gaming" OR "problem* videogaming" OR "gaming problem*" OR "video gaming problem*" OR "videogaming problem*" OR “gaming”

#5 money OR monetary OR payment OR pay OR transaction*OR cash OR cashless OR credit OR “note acceptors” OR “bill acceptors OR e-wallet* OR d-wallets OR EFTPOS OR “electronic funds transfer point of sale” OR cryptocurrency OR “digital payment” OR “digital transaction*” OR ATM OR “automatic teller machine”
#6 #2 OR #3 OR #4 OR #5
#7 #1 AND #6

Search 5: Gambling among vulnerable groups
#1 gambl* OR betting OR wager*
#2 ethnic* OR race OR racial OR cultur* OR “cross-cultur*” CALD OR “culturally and linguistically diverse” OR language OR “minority group” OR “minority population” OR migrant OR Korea* OR Vietnam* OR Arabic OR Mandarin OR Cantonese OR China OR Chinese OR Hindi OR India*
#3 Aborig* OR ATSI OR Koori or “Torres Strait Islander” OR Indigenous OR “first nations”
#4 “young people” OR “young person” OR “young adult*” OR youth OR adolescen* OR child* OR student* OR university OR school OR “emerging adult*” OR “early adult*”
#5 “family violence” OR “FV” OR “domestic violence” OR “DV” OR “intimate partner violence” OR “IPV” OR “partner violence”
#6 homeless* OR transient OR “rough sleep*” OR “temporary accommodation” OR “housing instability” OR shelter OR “drop-in”
#7 #2 OR #3 OR #4 OR #5 OR #6
#8 #1 AND #7

Search 6: Gambling industry products, practices, environments and regulation
#1 gambl* OR betting OR wager*
#2 market* OR advert* OR induce* OR incentive* OR promot* OR “loyalty card*” OR “loyalty program*” OR “sponsorship” OR “branding” OR commercial* OR “reward* program*” OR “sign up bonus” OR “sign-up bonus” OR “sign-up offer*” OR “sign up offer*” OR “refer-a-friend” OR “refer a friend” OR “free bet*” OR “better bet*” OR “bonus bet*” OR “better odds” OR “reduced risk” OR “money back” OR “cash back” OR “refund” OR “stake back offer*” OR “stake-back offer*” OR “stake/deposit offer*” OR “deposit offer*” OR “match* your stake” OR “reward point*” OR “happy hour*” OR “multi-bet offer*” OR “winnings paid for close calls” OR “cash out early”
#3 “free spin” OR “bonus feature” OR “near miss*” OR “losses disguised as wins” OR jackpot* OR “note acceptors” OR “animation” OR “sounds” OR “melody” OR “return to player” OR “speed of play” OR “audiovisual” OR “EGM feature*” OR “electronic game feature*” OR “game feature*” OR “electronic gaming machine feature*” OR “EGM characteristic*” OR “electronic gaming machine characteristic*” OR “structural characteristic*” OR “game characteristic*”
#4 “maximum” OR “multi-line” OR “multiple payline*” OR “multi-line*” OR “in-play” OR “in play” OR “live action” OR “micro*” OR “exotic” OR “each way” OR “each-way” OR “fixed-odds” OR fixed odds” OR “parimutuel” OR “pari-mutuel” OR “handicap” OR “total” OR “margin” OR “draw” OR “multi*” OR “complex”
#5 “staff train*” OR "staff education" OR “staff curriculum” OR "employ* training" OR "employ* education" OR “employ* curriculum” OR “employee” OR "manage* training" OR "manage* education" OR “manage* curriculum” OR “responsible service of gambling” OR “RSG” OR “Host responsibility” OR “corporate social responsibility”

OR “duty of care” OR “code* of conduct” OR “responsible gaming” OR “gambling responsib*”
#6 staff OR venue OR operator*
#7 identif* OR detect* OR indicator* OR assess* OR “surveillance” OR monitor* OR predict* OR approach* OR interact* OR interven* OR respon* OR track*
#8 #6 AND #7
#9 “cap” OR “caps” OR “accessibility” OR “proximity” OR “density” OR “distance” OR geographic* OR “spatial” OR “placement” OR “location” OR “opening hours” OR “operating hours” OR “shut down” OR “shut-down” OR “shutdown” OR “offshore” OR “off-shore” OR “off shore”
#10 regulat* OR legislat* OR policy
#11 “pre commitment” OR “pre-commitment” OR “limit setting” OR “limit-setting” OR “setting limit*” OR “limit” OR “consumer protection” OR “player protection” OR “responsible gambling” OR messag* OR “harm minimisation” OR “harm reduction” OR “harm minimization”
#12 “self-exclusion” OR “self exclusion”
#13 #2 OR #3 OR #4 OR #5 OR #8 OR #9 OR #10 OR #11 OR #12
#14 #1 AND #13

Search 7: Screening and assessment (to answer research questions within Theme 1 and Theme 3)
#1 gambl* OR betting OR wager*
#2 severity OR problem* OR symptom* OR dependen* OR pathology OR harm* OR consequence* OR impact* OR outcome* OR follow-up OR disorder
#3 instrument* OR measure* OR screen* OR assess* OR detect* OR questionnaire* OR tool* OR scale* OR index OR short OR brief OR development OR validation OR sensitivity OR specificity OR "ROC OR “false positive” OR “false negative” OR classification OR reliability OR “internal consistency” OR validity OR “test-retest” OR construct OR discriminant OR convergent OR concurrent OR predictive OR psychometric* OR performance OR surveillance OR diagnosis OR check
#4 #1 AND #2 AND #3

B2 – BASE search strategy

gambl* or betting or wager*

Appendix C: Targeted website search

Australian websites

1. NSW Gamble Aware
2. Victorian Responsible Gambling Foundation
3. Gambling Research Australia
4. Australian Gambling Research Centre
5. Tasmanian Government Department of Treasury and Finance
6. ACT Government Gambling and Racing Commission
7. NT Government Department of Industry, Tourism and Trade
8. QLD Government Department of Justice and Attorney-General
9. SA Government Department of Human Services

International websites

10. Alberta Gambling Research Institute
11. International Center for Responsible Gaming
12. Gambling Research Exchange Ontario
13. UK Gamble Aware

Appendix D – Eligibility criteria

D1. Eligibility criteria for overall review

Inclusion criteria for overall review

- Peer-reviewed or grey literature published from January 2020 – 7 September 2021 that were not included in the previous gap analysis
- Primary studies with empirical data (qualitative, quantitative, mixed methods) or reviews employing systematic searches (e.g., rapid reviews, systematic reviews, scoping reviews, umbrella reviews)
- Composite addiction samples (e.g., affected others of problem alcohol use and problem gambling) and/or composite addiction outcomes (e.g., measuring "alcohol and gambling" together) were only included where data was analysed and presented separately in relation to gambling or affected others

Exclusion criteria for overall review

- Published in a language other than English
- Descriptions without empirical data, theoretical studies, conference abstracts or proceedings, editorials and opinions, narrative reviews, books/book chapters and theses
- Animal studies
- Employed composite addiction samples and/or composite addiction outcomes, in which data was not analysed and presented separately for problem gambling
- Was an article that was included in the previous gap analysis
- Unable to retrieve full text of document

D2. Additional eligibility criteria for by research theme

Search 1: Gambling prevalence and harm

Inclusion criteria:

- Cross-sectional or longitudinal/cohort studies (2+ waves) using population-representative samples (>500 participants) of adults (with at least one wave conducted at average 16+ years of age)
- Measures gambling participation, problems, or harm (to gamblers and affected others)
- Studies that: (i) provide an estimate of gambling participation, problems, or harm; (ii) identifies risk and protective factors associated with the subsequent development of gambling problems; (iii) identifies problem gambling severity as a risk factor associated with subsequent harms; or (iv) explores transitions between levels of risk across multiple waves
- Problem gambling severity or harm is measured using a standardised and validated instrument using standardised scoring protocols

Exclusion criteria:

- Non-representative sample, including convenience, online panel, treatment-seeking or clinical samples
- Cross sectional or longitudinal/cohort studies based on school-based or adolescent samples

- Longitudinal/cohort studies in which all waves are conducted before the age of 16 years
- Evaluations of gambling intervention or prevention programs, or studies identifying predictors of treatment outcome
- Assess gambling behaviour (e.g., frequency, number of activities, expenditure) but not gambling participation, problems or harm

Search 2: Individual and community level prevention and early intervention

Inclusion criteria
- Children or adults of all ages in any country with or without a diagnosed gambling disorder.
- Any prevention or early intervention targeting gambling behaviour or gambling related harm.

Exclusion criteria
- Help seekers or people seeking support to change their gambling behaviours.
- Studies involving responsible gambling, consumer protection or government or industry tools or resources.
- Studies that only included people who have a diagnosed gambling disorder

Search 3: Efficacy and effectiveness of treatments

Inclusion criteria
- Population: Includes samples of children, adolescents, or adults in any country: (i) with a diagnosis of gambling disorder; (ii) with a self-reported or self-identified gambling problem; (iii) who sought treatment for their gambling; (iv) who self-report or self-identify as an affected other; or (v) who sought affected other treatment;
- Intervention: Any tertiary intervention (e.g., psychological interventions, pharmacological interventions, or self-directed interventions)
- Comparison: No control or comparison condition is required; but control conditions will include placebo, no-treatment (waitlist or assessment only), Gamblers Anonymous referral, non-specific treatment component controls, or treatment-as-usual conditions; while comparison conditions considered will include other psychological, pharmacological, or self-directed intervention conditions;
- Outcomes: For gamblers, the primary outcome will be gambling symptom severity and/or gambling behaviour (frequency and expenditure), while secondary outcomes include psychological comorbidities, psychological processes linked to treatment approach, global functioning or wellbeing, treatment acceptability or feasibility, and attrition; For affected others, outcomes can include personal and relationship functioning, gambling consequences, coping, social support, gambler engagement in satisfaction, and treatment acceptability or feasibility.
- Study design: Any study design (e.g., randomised controlled trials [RCTs], pseudo-randomised controlled trials, quasi-randomised controlled trials, non-randomised controlled trials, comparative studies, case series or studies, cross-over trials, feasibility/acceptability trials, user testing, cross-sectional, descriptive, qualitative)

- Professional help-seeking is defined as services that provide support from people who are professionally trained (Hing, Tiyce, Holdsworth, & Nuske, 2013). These can include distance-based help-seeking options, which are those that are frequently single session and usually anonymous options accessed by telephone or internet (i.e., chat and email) and face-to-face services, which are those that may involve one or more appointment based sessions (e.g., counselling) (Rodda, 2013).

Exclusion criteria

- Studies that examine gambling prevention or harm reduction interventions, such as supply reduction interventions (e.g., reduced opening hours), demand reduction interventions (e.g., youth prevention interventions), or harm reduction interventions (e.g., pre-commitment/limit setting)

Search 4: Gambling among vulnerable groups

Inclusion criteria:

- Children and adults of all ages and in any country who experience gambling harm (inclusive of affected others).
- Studies must include one of the vulnerable groups of interest and be collected from the target group individual (not by proxy).

Exclusion criteria

- Studies where the focus is not one of the target areas. For example, prevalence surveys that may include cultural groups or cross-sectional studies where a convenience sample was used (university students) but issues of youth/young adult status was not the focus of the paper.
- Treatment studies targeting problem gamblers where the sample includes young people. Prevalence studies where the purpose is to report on the rate of gambling.
- Studies that do not differentiate analyses for group of interest.

Note: Vulnerable groups of interest included CALD/ATSI, youth/young adults aged, family violence or homelessness.

Search 5: Emerging technologies and new trends
Inclusion criteria:

- Any samples of adults or adolescents
- Studies that provide the prevalence of participation, frequency, expenditure, problem gambling and/or harms in the relevant forms of gambling
- Studies that explore factors associated with problem gambling and harms in the relevant forms of gambling
- Studies that explore whether participation in the relevant forms of gambling predict problem gambling severity or harms
- Studies that evaluate the comorbidity/relationship between gambling and gaming disorders or explore factors associated with the comorbidity/relationship between gambling and gaming disorders;
- Studies that used or evaluated one of the relevant payment methods, regardless of aims

- Studies that utilised a sample of users of a relevant payment method, regardless of aims.

Note: Relevant forms of gambling were defined as e-sports betting, skins gambling, loot boxes, simulated gambling, cryptocurrency trading, in-game purchases and other skills-based features. Relevant forms of payment methods were defined as cashless gaming, e-wallets, d-wallets, EFTPOS payments at table and cryptocurrency.

Search 6: Gambling industry products, practices, environments and regulation

Inclusion criteria:
- Children or adults of all ages in any country with or without a diagnosed gambling disorder.
- Include studies with or without a control/comparison group, but data must be analysed and presented separately for topics of interest

Exclusion criteria
- Studies where the focus is not one of the topics of interest. For example a study may include a topic of interest but it is not the focus of the study.
- Descriptive only studies
- Studies that do not include differential analyses for factors of interest
- Counter advertising studies, (i.e., related to public health messaging on risks of gambling) or studies to increase the effectiveness of marketing (i.e., studies that focus on means of encouraging gambling or to increase market share
- Studies where focus is on the 'responsible gambling' behaviour of gamblers (rather than staff/venue)

Note: Topics of interest included marketing (advertising and inducements) of gambling products; product characteristics and bet types; staff training programs and/or host responsibility (RSG); consumer protection/responsible gambling tools and strategies; geographic and time-based accessibility to gambling; self-exclusion programs.

Search 7: Screening and assessment (to answer subthemes within themes 1 & 3)
Inclusion criteria:
- Studies with a stated aim of: (i) developing new measurement instruments for measuring gambling problems, harms or treatment outcomes; (ii) examining the psychometric properties (reliability, validity, diagnostic accuracy) of instruments for measuring gambling problems, harms or treatment outcomes; or (iii) exploring the relationship between screening/assessment of gambling problems on service engagement and outcomes
- Any sample of adults and/or adolescents in any setting (e.g., community, schools, gambling services, primary healthcare, mental health services, AoD services)
- Harm is defined as harms experienced by gamblers, others impacted by someone else's gambling, or the community
- Diagnostic accuracy is defined as estimates (true positive, true negatives, false positives, false negatives) than enable the calculation of diagnostic accuracy coefficients (sensitivity and specificity) for a tool compared to an appropriate reference standard (e.g., comparing the diagnostic accuracy of a tool for

measuring gambling problems to a structured/semi-structured clinical or diagnostic interview; comparing a brief screening instrument [≤5 items] against a self-report instrument with more than five items or a structured/semi-structured clinical or diagnostic interview)
- Service engagement is defined as assessment, referral and/or service usage
- Outcomes include gambling behaviour (any measure of expenditure, frequency, or duration), problem gambling severity (any standardised and validated measure), psychological distress (any standardised and validated measure, such as psychological distress, depression or anxiety symptoms), alcohol and substance use (any standardised and validated measure of use, abuse or dependence), and quality of life (any standardised and validated measure)

Exclusion criteria

- Studies describing the development or psychometric properties of instruments measuring gambling behaviour (frequency, expenditure) or other aspects of gambling behaviour (e.g., motivations, cognitions)
- Studies that fail to provide sufficient methodological or statistical information to enable conclusion in the synthesis of findings

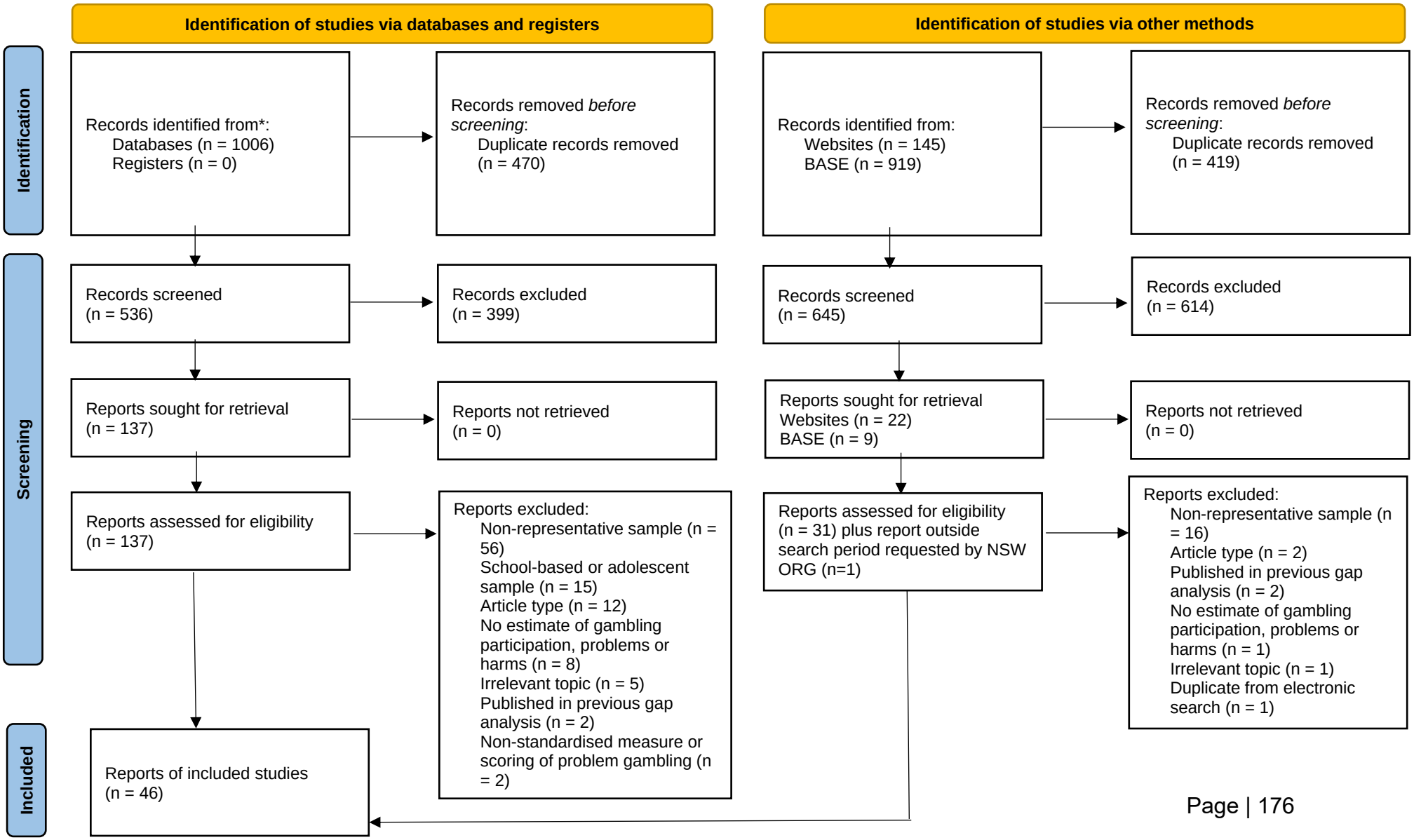
Appendix E PRISMA-ScR Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	Not reported due to nature of report
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	4-10
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	12, 15, 20, 25-26, 30, 36, 38-39
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	12, 160
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	NA
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	13-14
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	13
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	161-164
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	165-169
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	14
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	NA
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this	NA

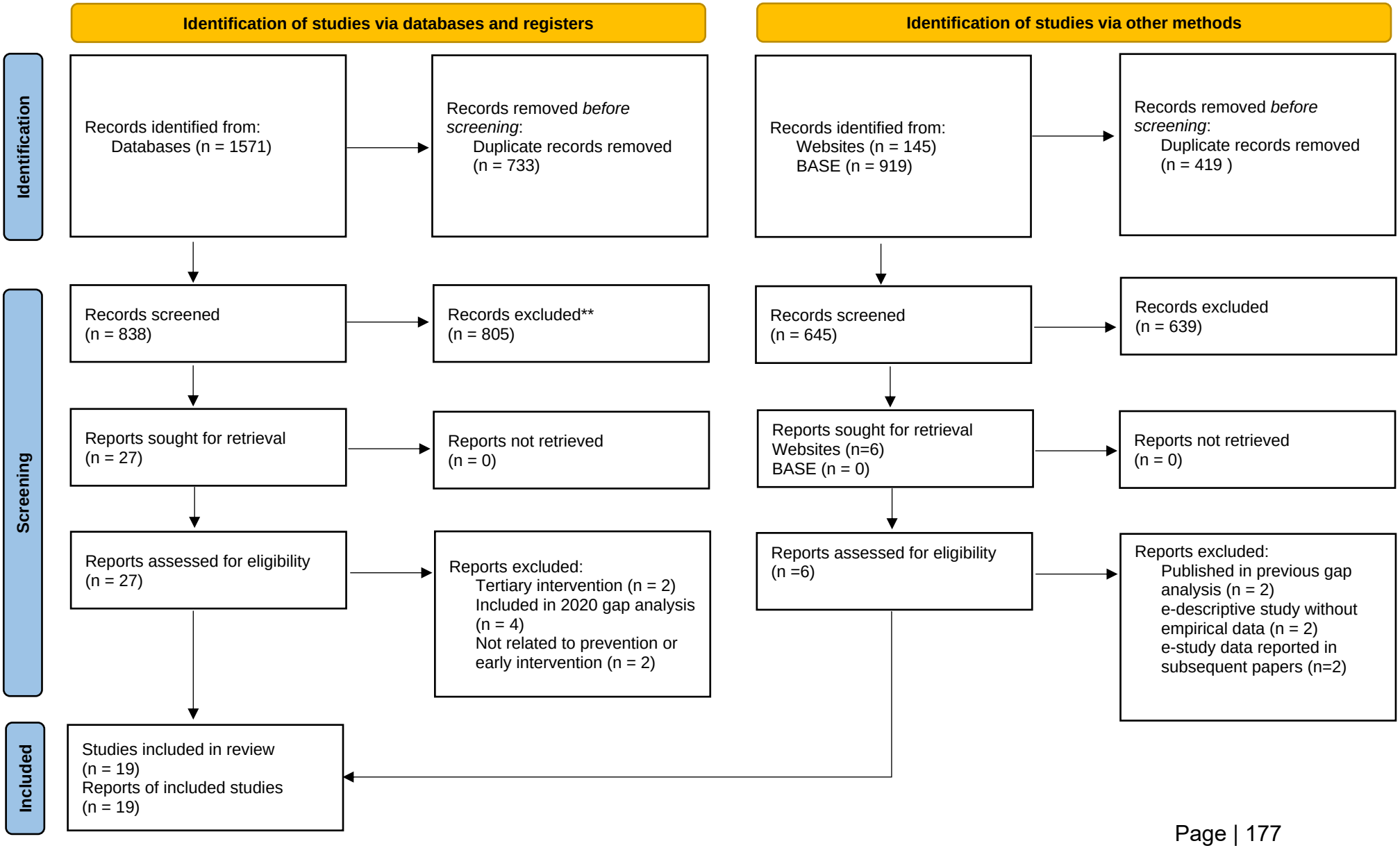
SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
		information was used in any data synthesis (if appropriate).	
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	14
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	172-178
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	47-136
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	NA
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	47-136
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	15-44
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	15-44
Limitations	20	Discuss the limitations of the scoping review process.	Not reported due to nature of report
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	45-46
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	2

Appendix F PRISMA Flow Diagrams for new systematic reviews, includes searches of databases, registers and other sources

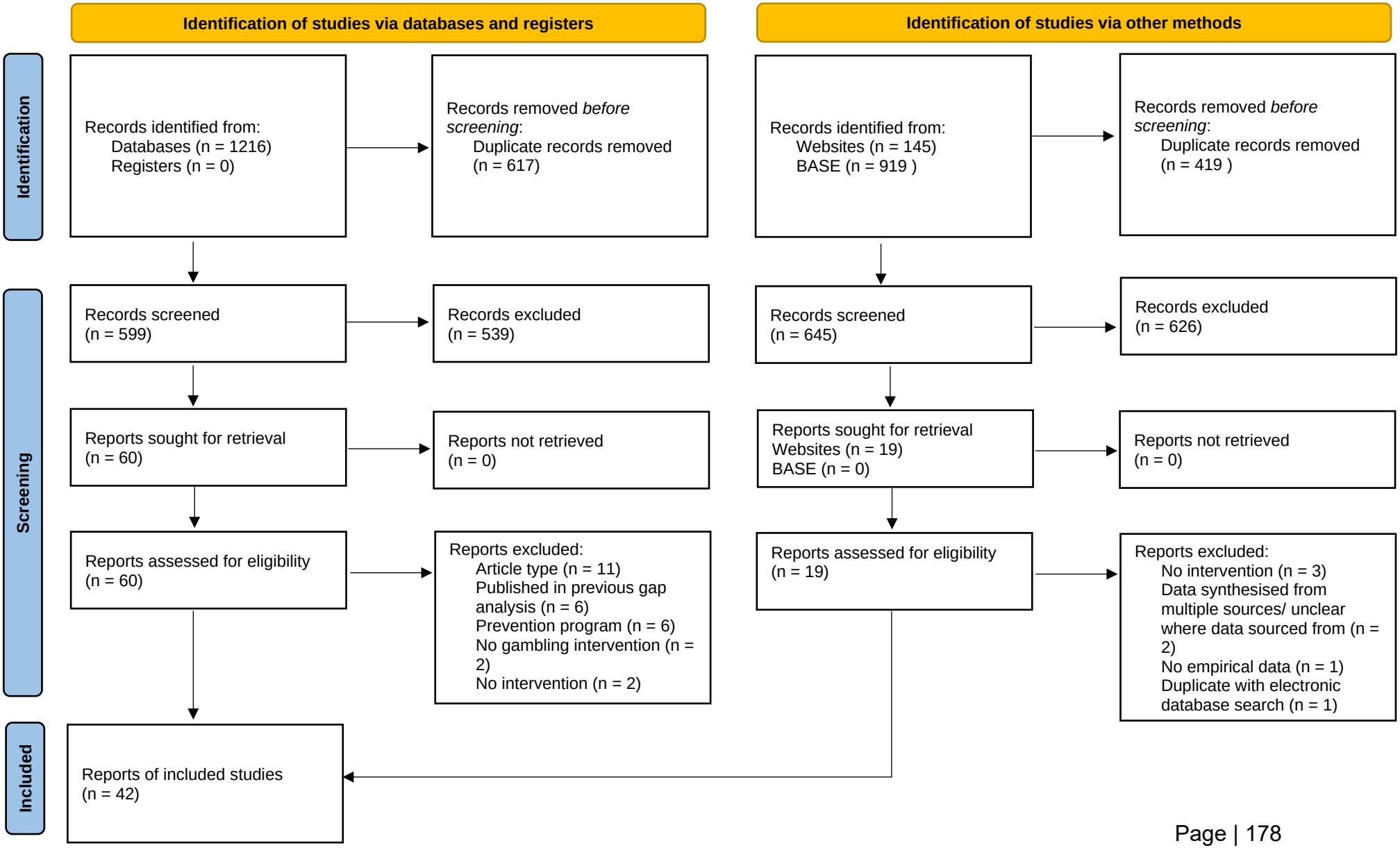
Search 1: Gambling prevalence and harm PRISMA 2020 flow diagram



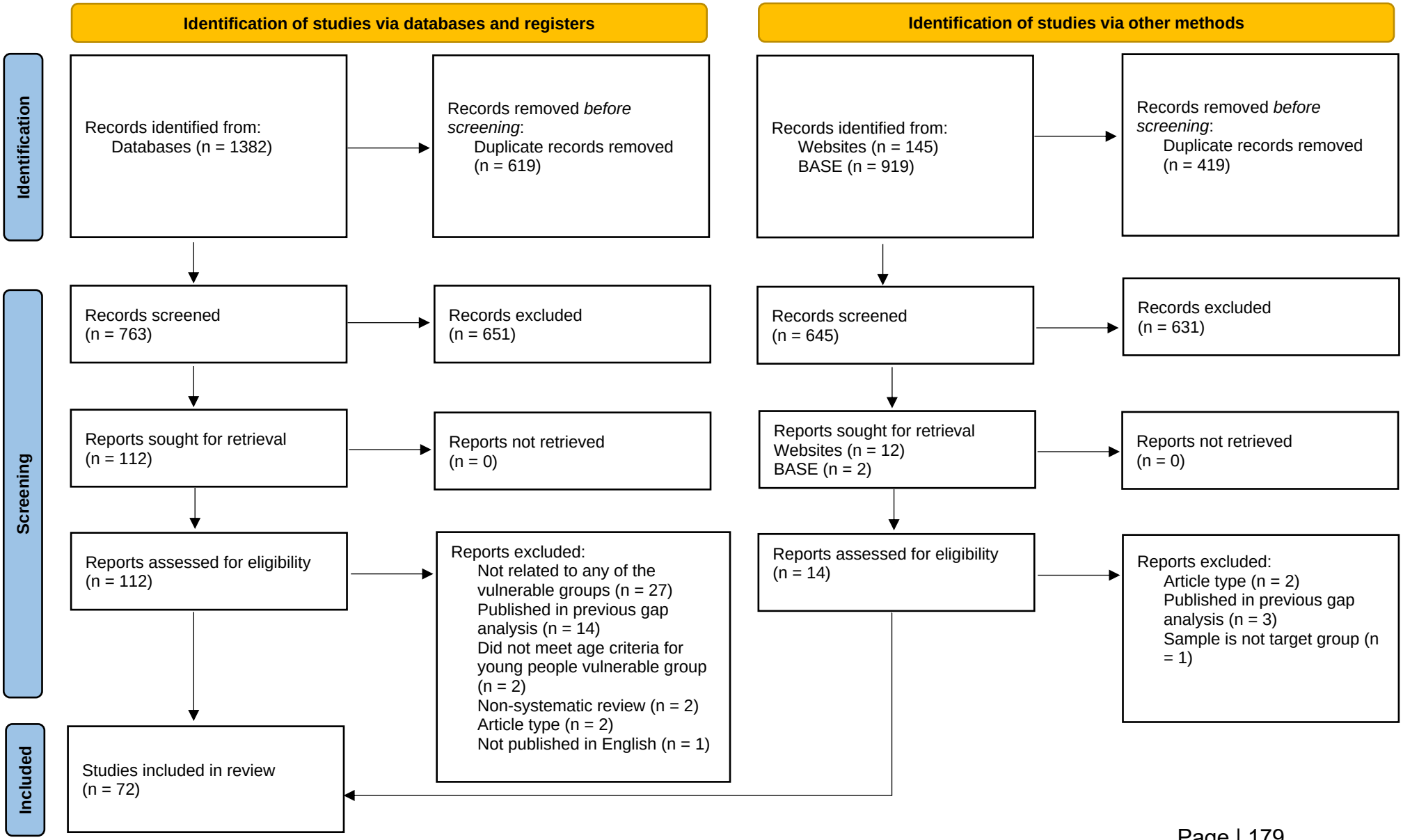
Search 2: Individual and Community-level Prevention and Early Intervention PRISMA 2020 flow diagram



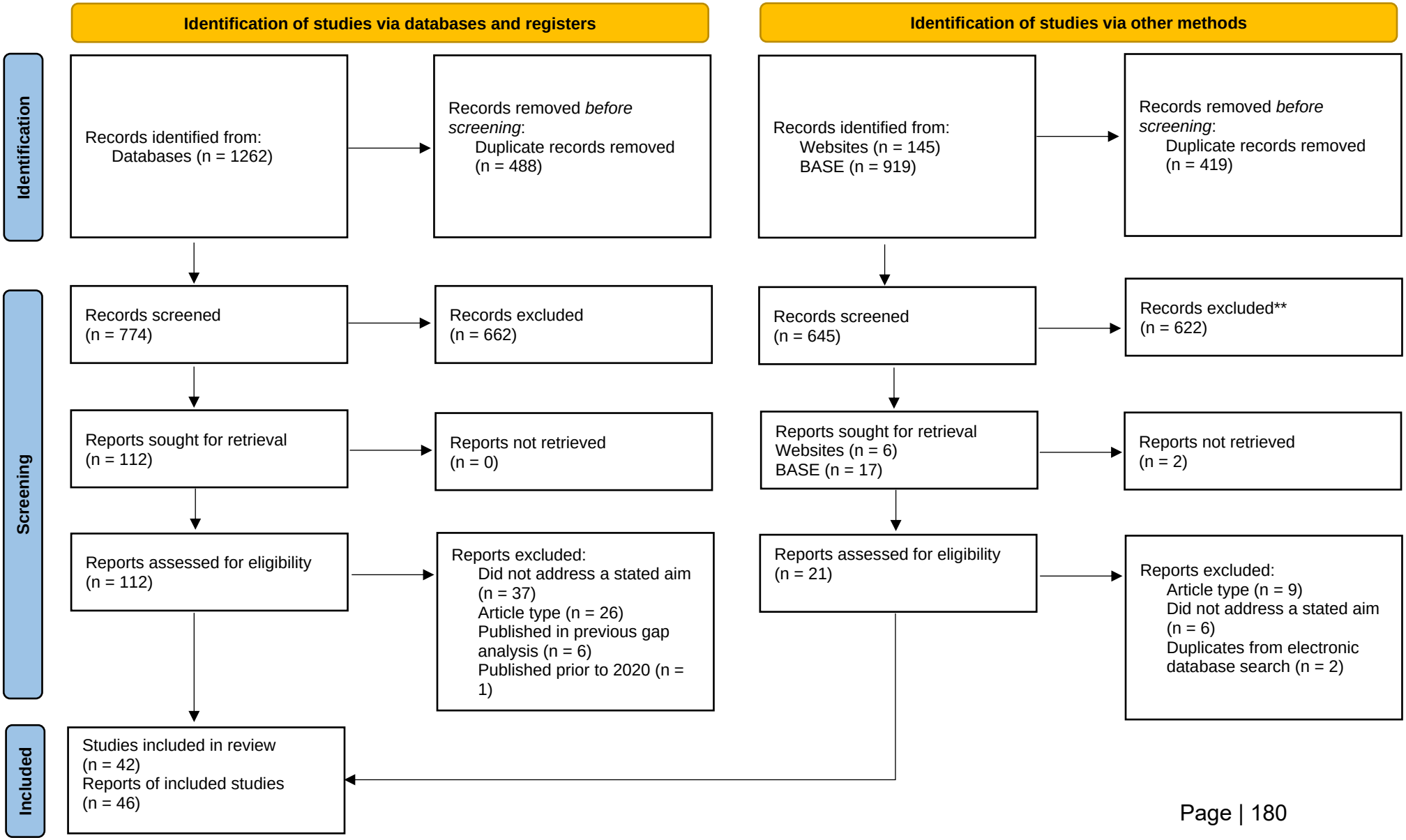
Search 3: Efficacy and effectiveness of treatments PRISMA 2020 flow diagram



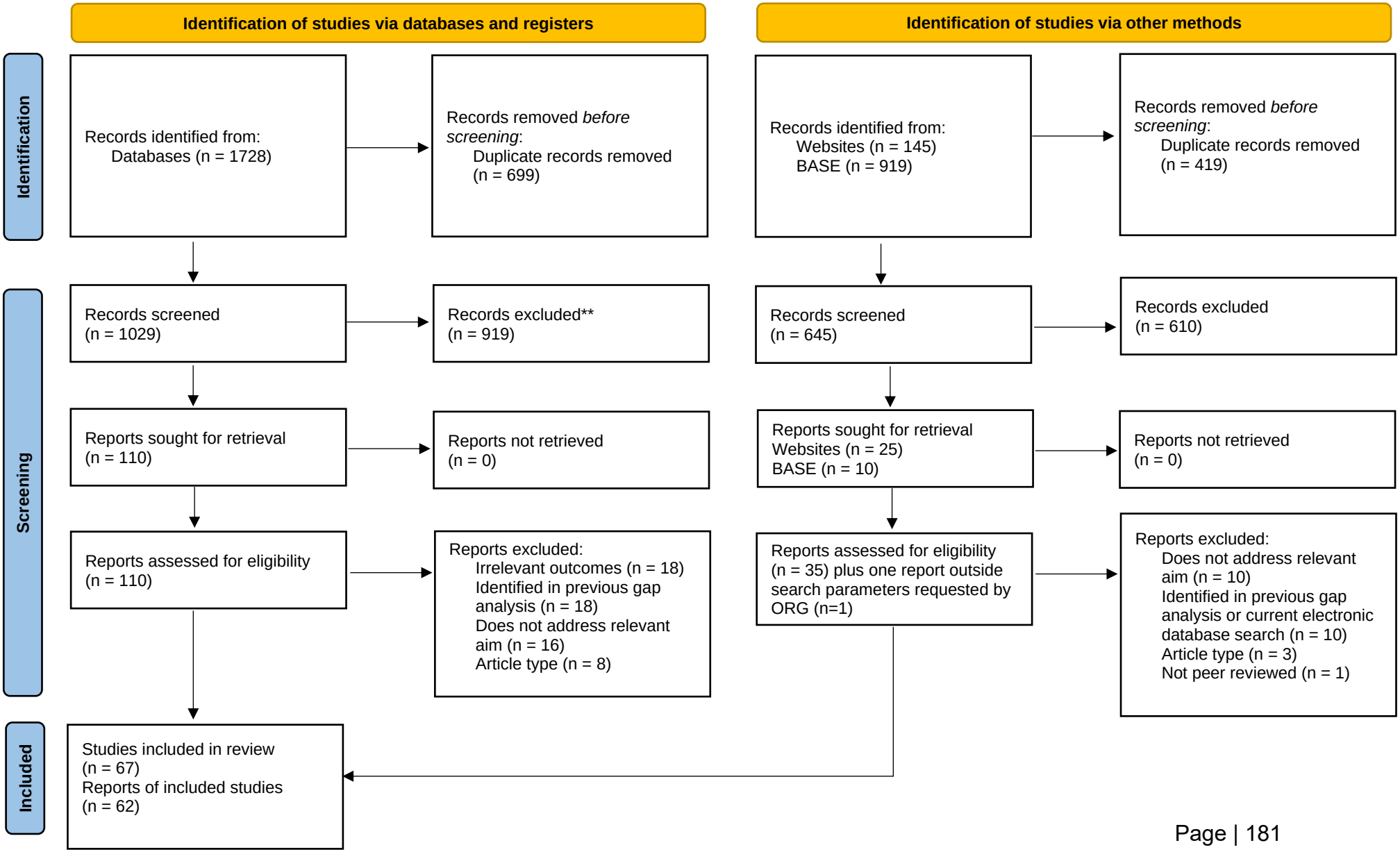
Search 4: Gambling and Vulnerable Groups PRISMA 2020 flow diagram



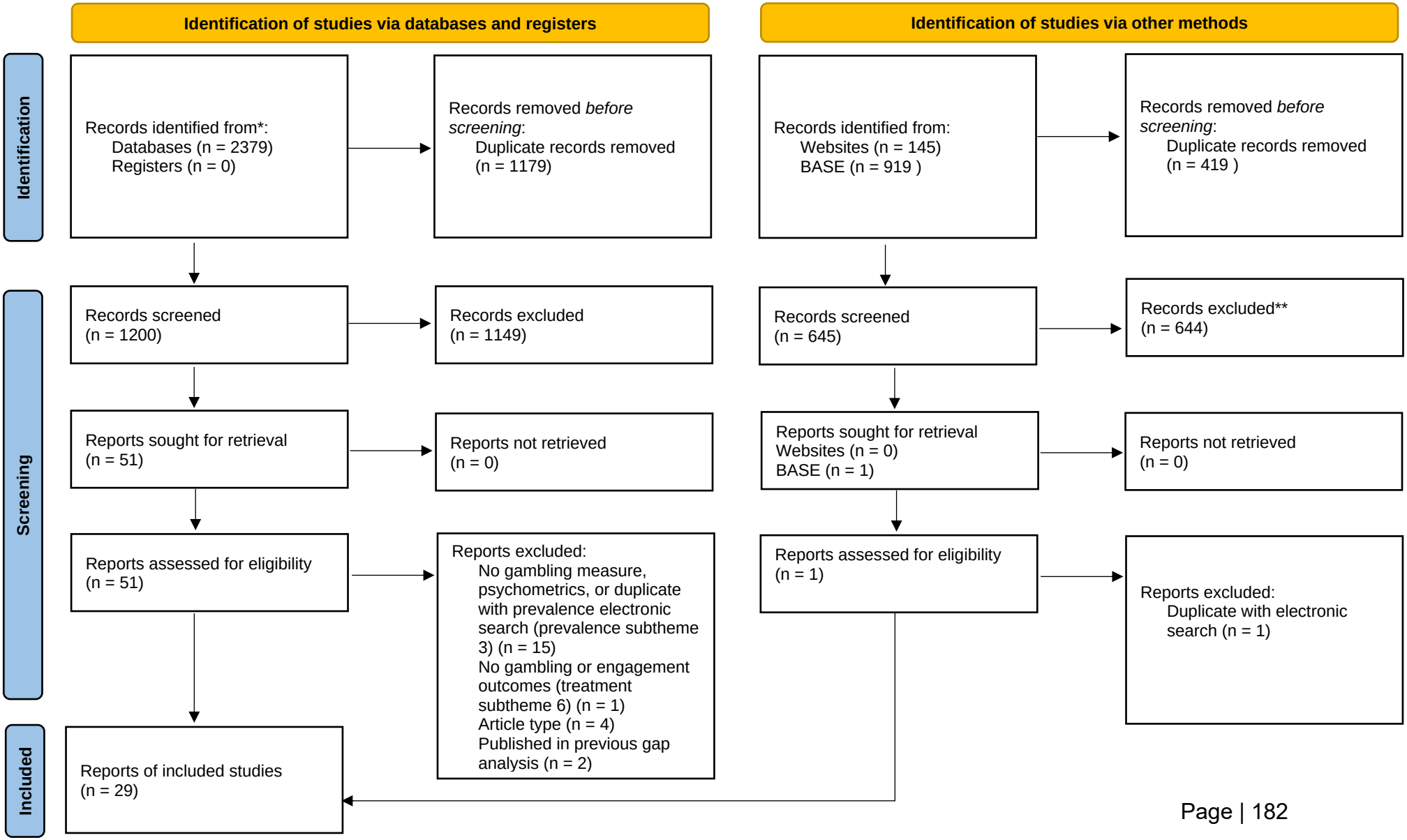
Search 5: Emerging technologies and new trends PRISMA 2020 flow diagram



Search 6: Gambling industry products, practices, environments and regulation PRISMA 2020 flow diagram



Search 7: Additional PRISMA 2020 flow diagram related to screening and assessment-related subthemes within Themes 1 and 3



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