PREPARED FOR THE INTERIM EVALUATION OF THE PREVENTION PARTNERSHIPS PROGRAM

PREVENTION OF GAMBLING-RELATED HARM

A REVIEW OF THE EVIDENCE

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Executive Summary

Purpose

In 2016, a literature review (Pettman and Armstrong 2016) was undertaken to summarise evidence on the prevention of gambling-related harm as a complex public health problem. At that time, it was found that public health approaches to prevent gambling-related harm were emerging, but still in their infancy. To that end, this section provides an update on the review with a focus on identifying any new or additional knowledge that has emerged to describe:

1. **how gambling-related harm prevention is described in the literature, with a focus on new evidence of the effectiveness of prevention/public health interventions**

This section is a summary of a more extensive review (Pettman 2018) which describes in detail some of the latest evidence on primary, secondary and, to a lesser extent, tertiary prevention strategies. This will, in turn, provide a lens by which the design, delivery, outcomes and value of funded projects and the Program can be viewed. The review will also help to inform any future iterations of the Program by documenting and interpreting some of the main contemporary themes from the literature.

Key findings

In the previous review (Pettman and Armstrong 2016), the focus was on understanding the state of the evidence as it related to gambling-related harm. While the new review (Pettman 2018) provides an update, it also sought to interpret the state of the evidence through application of models of public health. This process suggests that:

- **Current gambling-related harm prevention strategies focus predominantly on personal skills and knowledge, suggesting a need to expand approaches to include multiple complementary strategies**. This includes policies, creation of health-promoting environments (e.g. physical infrastructure, socio-cultural norms), and community action (as well as support to individuals to make healthier choices easier).
- **Underpinning such approaches is partnerships**; and necessary system enablers include leadership, governance and coordination; evidence, research, evaluation and monitoring (and feeding back learning); the capacity of the workforce; and funding and organisational commitment.
- **Current prevention strategies identified in the literature predominantly relied on influencing individual behaviour and control, and to some extent, factors in products and organisations (gambling environments only)**. This indicates a need to revisit a social or ecological model of health which views health and behaviour from multiple perspectives. This would include characteristics of the individual but also influences of interpersonal networks such as peers and family; exposures in organisations and environments; communities; and policy and legislation.

Finally, the state of the literature highlights the need for stronger efforts in the design of prevention programs. While there were more evaluations and studies into interventions published, there was a general lack of underpinning theory to inform design – both in terms of how it links to models of

public health – but also a general theory of change (i.e. on what evidence are we basing our assumptions for the effectiveness of a program?)

Summary of findings related to interventions

Another key element of this review was exploring any changes in the nature of interventions being delivered to reduce gambling-related harm. The review found that:

- **Predominantly, there were a number of reviews and individual studies on secondary (targeted) prevention strategies specifically in gambling environments** (e.g. venues). These studies provided evidence of the effectiveness of specific responsible gambling or harm minimisation strategies, such as:
    - Responsible gambling EGM features including dynamic messaging, particularly with personalised/normative feedback;
    - employee training;
    - self-exclusion, as well as emerging evidence on $1 maximum bets;

  Other upstream measures recommended by authors in the field included banning food and beverage service at EGMs, limiting cash withdrawals, together with binding universal pre-commitment systems.
- There were reviews and studies of **primary (universal) prevention delivered with young people** (e.g. educational programs in schools) in small-scale, short-term interventions, **which generally confirmed previous review (Pettman and Armstrong 2016) findings**. Interventions were generally all short-term programs evaluated with children and adolescents, which aimed to:
    - increase knowledge about gambling
    - modify misconceptions about gambling; and
    - examined skills also in some cases.

  Weak evidence demonstrated short-term improvements in knowledge and attitudes towards gambling, but impact upon gambling behaviour post-intervention and in the longer term is unknown.
- Other **primary prevention and health promotion** examples included workplace interventions, and initiatives engaging community action in New Zealand, Canada, and Australian Aboriginal communities. While outcome evaluations were not available, information was provided on useful context about the community engagement processes, important included population groups and the types of strategies implemented.
- **One evaluation of a brief intervention in a primary health care setting** reported feasibility and potential usefulness for identifying people at risk of problem gambling in primary care.

Summary of implications for prevention practice and research

As we see it, it is also important to consider the implications for prevention practice and research given the current state of the evidence. These implications can potentially be factored into the future design and delivery of prevention programs and projects. These are:

- **Primary prevention programs need more careful design and implementation to deliver substantial public health impact**, and must move beyond addressing individual factors, to

include changes in environments and policy where more pervasive exposures and determinants of gambling-related harm exist.

- **Targeted (secondary and tertiary prevention) interventions may need to be better implemented and enforced** to reach the intended populations and demonstrate benefit. Many responsible gambling features on products and in venues depend heavily on individual control and self-regulation, which is problematic, and may therefore need to be incorporated into universal, binding pre-commitment technology to ensure appropriate reach and dose**.**
- **Overall, prevention strategies require better design** and in particular, stronger theoretical underpinning – a lack conceptualisation of likely mechanisms of change may help to explain the modest results achieved in some youth programs to date.
- **A broader range of prevention efforts may be required to prevent harm along the prevention continuum.** The evidence points to areas where we need to balance strategies that minimise harm among those at greater risk, with efforts to prevent harmful exposure before it occurs in the broader population and protect vulnerable groups (e.g. children).
- The limited range of prevention strategies suggests that a more comprehensive approach is needed. **A multi-strategy intervention approach** would also engage community action; create supportive environments; and implement stronger policy and regulation. Evidence-informed health promotion strategies support individuals to make healthier choices easier.
- **Harm prevention across the larger population who do not gamble, or who gamble at low-risk levels, could be augmented** with a more comprehensive public health approach that encompasses products, environments and marketing through restrictions on, or interventions related to, any of these aspects. Action on these determinants of gambling would seek to increase accountability and reduce the conflicts of interest influencing governments in managing their gambling environments. Such an approach is likely to be beneficial by producing small improvements across larger populations.
- **A clearer framework for preventing gambling-related harm may be useful for informing both practice and research,** for example one that combines harm minimisation and protection with primary prevention and health promotion to tackle the wider implications of gambling expansion.
- **The current Prevention Partnerships Program (PPP)** is a novel approach and represents one of very few attempts to engage community action and influence organisational/institutional and community factors to prevent gambling-related harm.
- **The effectiveness of the PPP**, and our understanding of its impact, could be augmented through longer-term repeated measures collected systematically – this would also enable us to contribute to the international evidence base.

There are also some implications for research and evaluation practices:

- **At present the evidence base is limited to research on small-scale programs in fairly controlled settings**, and responsible gambling strategies mainly in 'laboratory' style studies, which limits the applicability (feasibility) and transferability (generalisation) of the evidence. Understanding research priorities from a community practice and public policy perspective may assist in addressing current gaps and guiding future research agendas.
- **Research gaps** include: interpersonal interventions, workplace initiatives, certain responsible gambling features and environments (e.g. limit setting; staff responses to gambling), gambling venue layout/design to reduce exposure and harm.

Finally, some implications common to research and prevention practice include:

- **The conceptualisation of prevention approaches in the current literature could be improved in terms of how public health principles are applied**– this may help to better inform future public health practice and research. A more sophisticated understanding of the determinants (discussed previously) and the role of universal or primary prevention may facilitate development and evaluation of strategies with broader reach to larger populations.
- **Evaluation of current practice would benefit from greater attention and investment,** which could involve research-practice partnerships to evaluate community projects, so that lessons learned in practice can be applied more broadly. Stakeholder engagement, leadership from funding organisations, and integrated knowledge translation may help facilitate partnership research/evaluation and co-create stronger evidence about program impacts.

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Purpose

The **rationale** for this follow-up literature review is to identify any new, additional knowledge that has emerged on the prevention of gambling-related harm as a complex public health problem, since our last review of this evidence (October 2016). The **objective** of this update is to address the question:

1. how **gambling-related harm prevention** is described in the literature, with a focus on new evidence of the **effectiveness** of such prevention/public health interventions

In updating the literature that was previously reviewed, we are interested only in emergence of **new evidence of primary (universal), secondary (selected) and to a lesser extent, tertiary (indicated) prevention strategies aimed to prevent gambling-related harm.** We focused on the reported effectiveness of such prevention strategies.

Methods

For the initial search, PICO keywords were identified to guide systematic searches, which were repeated for this search update. The search was designed to retrieve evidence relevant to all populations, on all primary, secondary and tertiary prevention strategies (including harm minimisation), reporting any outcomes related to gambling-related harm prevention.

The search included articles from 2016 – April 2018, to update the previous search which included 2006 – July 2016. We systematically searched Medline; and manually searched two repositories including "Gambling Research Exchange Ontario" and "Health-evidence" using keyword phrases (due to resource constraints and to reduce the duplication experienced in the 2016 search, the 2018 search was not performed in EMBASE and Psychinfo in addition to Medline). Search strategies are described in **Appendix 2.**

To enable an efficient review of the literature, no quality assessment/risk of bias assessment/critical appraisal of the articles was performed, nor was grading of the cumulative evidence. Over a third of the articles retrieved were systematic reviews which included risk of bias assessments of the included individual studies.

Results are summarised narratively, categorised by type of prevention intervention, in order to assist use of the findings. While a specific reporting method was not applied, we have attempted to report this literature review in the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) format where possible.

Findings

Included studies

We found **116 articles** on gambling-related harm prevention **published in the past 2 years**. After screening on title and abstract, **35 were included** (in the 2016 search, 52 articles included, published in the past 10 years), obtained from GREO (23), Medline (11), and Health Evidence (1). A total of 81 were excluded as they were not related to prevention (79) or not related to gambling (2). One additional article was discovered in hand-searching reference lists that was deemed relevant, so in total **36 articles were included in the review.**

Only 9 of the 36 articles did not describe/evaluate an intervention while the other 27 articles (75%) evaluated either primary, secondary or tertiary prevention interventions/programs/strategies (2016: 38 articles of 52 were interventions, 73%). In total, 13 of the intervention articles in the updated search (36%) were reviews or systematic reviews, suggesting that evidence has accumulated to the point where synthesis has become necessary and relevant as a method to understand and translate the state of the evidence on prevention. Most of the studies published since 2006 contained within the reviews were captured in our original review, suggesting that our previous search strategy was adequately sensitive.

We focused the discussion around the **primary and secondary prevention** interventions, given the focus of the PPP. The way in which we defined primary and secondary prevention is outlined in **Table 1**, which is the same reference information used previously, but has been updated by adding examples of different types of action across the prevention continuum.

Table 1 Population target groups for prevention of gambling-related harm

Term for strategy	Primary prevention	Secondary prevention	Tertiary prevention
Alternative term*	Universal e.g. whole populations	Selective e.g. subgroups of a population	Indicated e.g. indicated individuals
Target in population	Whole populations, well populations	Those at increased risk of the health issue/problem	Those with established signs of the health issue/problem
Examples^	Programs attempt to prevent the onset of gambling behaviour from becoming at-risk gambling. Goals: increase awareness of the risks and consequences associated with problem gambling	Programs aim to reduce risk exposure, improve coping skills, problem solving abilities, and substitute healthier activities, among for example children of problem gambling parents. Goals: to prevent more severe problem gambling from developing	Programs such as family-oriented interventions for problem gambling, treatment programs and services for problem gambling individuals, including adolescents.

*Adapted from: (Rodgers, 2015)(Messerlian et al., 2005) * (Gordon, 1983) ^(Dowling et al., 2010)*

Research not evaluating a prevention intervention

Of the nine articles that did not evaluate a specific intervention, important evidence was also identified which points to **modifiable determinants, behaviours, opportunities and target areas** for action. Key findings are summarised below:

The role of **adolescent attitudes and parental relationships** in gambling was explored in a study (Canale et al., 2016) assessing links between perceived parental knowledge (adolescents' perceptions of their parents' knowledge of their whereabouts and companions), and adolescent gambling behaviour, as well as mediating effects. Adolescents who perceived higher levels of parental knowledge were more likely to disapprove of gambling, and show higher awareness of its harmfulness, which was also negatively related to gambling frequency. This group was also less likely to perceive their friends as gamblers, which was also negatively related to gambling frequency. These factors may be protective against adolescent gambling behaviour.

The issue of **adolescent problem gambling (PG)** was also reported by GREO through a review (GamblingResearchExchangeOntario, 2017b) of risk and protective factors for PG, and guidelines for action. They found few prevention programs available for adolescent PG, and a lack of family

involvement in programs despite this being a best practice. They also found the demand for problem video gaming treatment is higher than PG services for adolescents.

A series of studies by Australian researchers described **influences on gambling attitudes and intentions among children** (Pitt et al., 2017), and towards **gambling product harm and harm reduction strategies** (Thomas et al., 2017); and the **influence of marketing strategies on betting attitudes and behaviours** (Deans et al., 2017). The study among children found that perceptions of different products were shaped by what they had seen or heard, and gambling behaviours were influenced by family members and culturally valued events. Also, children indicated consumption intentions towards sports betting. These socialisation factors, particularly family and the media (predominantly via marketing), may be shaping children's gambling attitudes, behaviours and consumption intentions, indicating a need for regulations to reduce children's exposure to protect them from harms. The influence of marketing studies found a) that marketing plays a strong role in the normalisation of gambling in sports, again with a call for appropriate legislation to address this culture; and b) that there was strong agreement with the need to ban gambling advertising during children's viewing hours, during sporting matches and at sporting venues, and the majority agreeing with reducing and restricting EGMs, and providing more public education on negative consequences from gambling.

A **media content analysis** related to sports betting by the above authors (David et al., 2017) showed that discussions about the marketing strategies utilised by the sports betting industry was still a main theme in media articles, while discussions relating to sports betting reforms decreased, suggesting a need for public health advocacy messages about why regulatory reform is needed.

A **content analysis of public statements and documents from four unhealthy commodity industries** (Petticrew et al., 2017) including gambling, found ways that industry used arguments about public health issues to dispute their role in causing public health harms (e.g. from advertising or products), and to limit the scope of effective public health interventions. Typical examples included their endorsement of research supported by industry-funded charities (e.g. 'GambleAware'), and manufacturing or re-wording the findings to support their position – for example, to support the notion that problematic gambling behaviour is 'complex' and that existing research does not provide sufficient grounds for intervention. The industry also often identifies the individual, rather than any products or activities, as the source of problem gambling. The industry also uses the 'complexity' argument to reject changes to the structural characteristics such as bet limits, and products (such as fixed odds betting terminals in the UK, which are associated with high rates of problem gambling). Overall this research confirmed that industries argue that individual products cannot be blamed for 'complex' problems, and they espouse that public health measures are 'too simple' to address these issues. Meanwhile, an inherent contradiction was found, in that their alternative solutions proposed are generally not complex. The misuse and misrepresentation of evidence (e.g. 'pseudo-scientific' processes and language) creates uncertainty and undermines scientific consensus, which can inhibit potential for effective policy responses. This research should be considered in progressing more effective regulation of profitable industry activities that are harmful to the public's health.

A study to assess the **link between coherence and gambling severity** (Langham et al., 2016) aimed to explore **why some people experience problems with gambling, whilst others are able to restrict**

gambling to recreational levels. The authors drew upon a sociological and health promotion approach of understanding factors called salutogenesis, which focuses on factors that moves people towards health, rather than on factors that cause disease. The study examined the relationship of individuals' sense of coherence on their gambling behaviour and experience of harm, using a previous survey dataset. Sense of coherence was significantly related to the experience of individual gambling harms (strong sense of coherence = protective against problematic gambling behaviour and subsequent harms). The authors recommended that primary and tertiary prevention strategies aim to strengthen sense of coherence.

A study of **individuals' interpretation and adoption of RG practices** in Macao, China (Tong et al., 2018) found that while many were aware of RG, their knowledge of RG practices was limited, and very few could identify major practices such limits on gambling amount and time, and self-exclusion, suggesting further and more tailored promotion is required, through appropriate procedures.

Prevention interventions

The 27 articles evaluating or describing prevention interventions are synthesised narratively, grouped by action area/type of intervention according to the Ottawa Charter for Health Promotion (World Health Organization, 1986). All prevention interventions are noted in **Appendix 1**, categorised as either primary, secondary or tertiary interventions.

Interventions for developing personal skills

A systematic review of **problem gambling prevention programs for children** (Kourgiantakis, 2016) examined the types of prevention used and whether programs targeted specific subgroups (17 studies). Consistent with our previous review, most interventions were school-based prevention programs targeting entire school populations. No secondary or tertiary prevention approaches that target children with a parent experiencing problem gambling (PG) were found, even though the risks are much higher for these children. Also consistent with our previous findings, most programs either (1) aim to increase knowledge about gambling and modify misconceptions about gambling; or (2) includes the same information as the first type and examines skills in the participants as well. Most studies (n=16/17) reported increased knowledge and changed attitudes towards gambling in children, and only two studies showed changes in gambling behaviour post-intervention. This review builds upon our previous findings by highlighting that most programs are universal and do not target children of PG parents or any other specific subgroups through secondary and tertiary PG prevention programs. The authors recommended further targeting when working with young people, for example family-focused prevention strategies (e.g. family strengthening programs implemented in substance use).

A comprehensive and transparent systematic review of **school-based gambling education programs** (Keen et al., 2017) was published shortly after the above review, and evaluated primary prevention among adolescents (19 studies). Over half of the studies lacked behavioural outcome measures, and only four assessed follow-up outcomes beyond six months, so the sustainability of any changes related to intervention is unclear. Most studies were of moderate or weak quality evidence. Other assessments of the content and quality of the evidence were useful for informing future evaluations of similar interventions. Many of the studies demonstrated changes in knowledge, beliefs and attitudes, but this did not necessarily translate into changes in behaviour. The authors suggested

was likely the result of 1) inaccurate measurement of problematic gambling in adolescence, and/or 2) a lack of theoretical conceptualisation in program design. Recommendations for practice were given to prevent gambling problems from occurring, rather than preventing gambling or treating adolescents identified as 'problem gamblers'. Authors recommended that programs focus on unprofitability experienced by users (e.g. expected value), and connect new knowledge with existing knowledge and familiar experiences (most adolescents have not gambled inside a casino, but might be familiar with football tipping). For this population, future evaluations are advised to measure reductions in harm, not frequency or expenditure (as these are typically very low, and unreliable), and conduct follow-up assessments into adulthood (or time of legal age).

A narrative review described the range of **youth educational gambling prevention programs** (Oh et al., 2017), including programs focusing on either risk factors or protective factors, with reported effectiveness (17 studies). Program effects were reported in increasing knowledge and correcting misconceptions about gambling and improving resistance towards gambling misconceptions. Consistent with previous reviews, the authors acknowledge that evidence is not sufficient to conclude whether knowledge and beliefs can effectively prevent gambling behaviour.

A **school-based youth gambling prevention program** (''Who really wins?'') aimed to minimise risk and enhance protective factors related to youth gambling, among high-school students in Croatia (Huic et al., 2017). The training focused on knowledge about risky nature of gambling and mathematics of gambling, cognitive misconceptions and critical thinking, and intra- and interpersonal social skills (problem solving, decision making, self-efficacy, and peer pressure resistance). Changes were assessed in problem gambling **awareness, cognitive distortions, knowledge of the nature of random events; and social skills**. Behavioural effects were not determined. Decreased risk factors including improved knowledge and cognitive distortions were observed in the training group. Protective factors such as problem solving skills, refusal skills, and general self-efficacy were not observed. Findings were consistent across gender, school types, and risk levels. No negative behavioural effects were detected. It was concluded that longer-term evaluation would be necessary to determine whether the outcomes result in behavioural change.

A **web-based gambling intervention (WBI) program targeting adolescents** (14-18 years, school students) was evaluated in Italy (Canale, 2016), comprising online feedback and training activities. The intervention was designed to directly address risk factors including gambling-related cognitive distortions, and realistic attitude beliefs about gambling. The WBI was somewhat effective at improving these risk factors, in that students receiving the WBI reported a reduction in gambling problems, whereas students in the control group reported a non-significant increase. No significant effects were observed in gambling frequency, expenditure, and attitudes toward the profitability of gambling. The authors suggest that the program might be most useful if targeted to students with the highest baseline levels of gambling frequency and/or symptoms of problem gambling.

Interventions for creating supportive environments and products

Several reviews and studies were found on strategies applied to gambling products and environments. In attempting to synthesise the evidence we were unable to group strategies according to how the intervention is implemented (e.g. by the **individual** e.g. self-exclusion), or by the **product/environment** (e.g. enforced breaks in play), due to the multiple strategies evaluated within reviews.

A review of evidence **underpinning responsible gambling (RG) strategies** (Ladouceur et al., 2017) included empirical studies focusing on RG related topics, that were set in gambling environments with 'real' gamblers, to improve the transferability of findings (29 studies). The authors noted that the RG research field remains without a systematic approach for evaluating the body of evidence, so this review used a system for identifying studies by defining threshold level methods capable of demonstrating scientific efficacy that can support decision-making and implementation. The review found five primary RG strategies with supporting evidence, including **(1) self-exclusion; (2) gambling behaviour to develop algorithms that can identify sentinel events (behavioural tracking); (3) limit setting; (4) responsible gambling machine features (including messaging); and (5) employee training**. Self-exclusion programs demonstrated some effectiveness as a component of RG programs despite various limitations including low utilization rates, breaching the agreement, and minimal evidence about the long-term outcomes. The knowledge on behavioural indicators and their use in RG tools was considered to be underdeveloped. Evidence on limit setting (monetary and time, mandatory and voluntary) suggests that limit setting can be effective for promoting RG, only for some individuals – it can increase gambling problems for others – therefore the potential consequences of limit setting efforts should be carefully considered. EGM features were reported to be modestly effective for limiting excessive gambling. Finally, venue staff assisting patrons experiencing problem gambling demonstrated partial effectiveness.

A useful evidence summary described RG programs and tools available in Canada, and the state of the evidence on such strategies (Robillard, 2017). Evidence of effectiveness was summarised on **enforced breaks in play, automatic informative messages, limit settings, behavioural tracking tools, self-exclusion programs, staff training and marketing of RG**. The summary reported that only a few RG strategies have shown promising results in changing gambling practices, which included dynamic messaging (containing self-appraisal messages, personalised normative feedback, or time/monetary reminders), limit-setting (if prompted before engaging in a gambling session and if set by the gamblers themselves, not operators), and in the short-term, self-exclusion. Limitations, and recommendations on how to improve these programs, are provided in the evidence summary. Other strategies have the potential to support self-awareness and self-control, as well as counteract misconceptions and erroneous cognitions. For example, as a preventive measure, behavioural tracking tools are showing positive but small and short-term effects on behaviour change, and appear more effective for those at-risk of problem gambling – there appeared to be minimal effect on problem gamblers/high risk of problematic play. Other strategies require further research before stronger conclusions can be made – for example staff training to respond to problem gambling, and promotion and marketing of RG (which has had little effect on behavioural change). Overall, it was concluded that research on RG has yet to reach consensus, and does not fully address contextual factors. That is, while various RG strategies have shown potential, the operationalization of RG is often problematic if it is reliant on consumers, guided by notions of individual responsibility, freedom of choice and deregulation of markets.

A systematic review evaluated **protective behavioural strategies** (Drawson et al., 2017) such as **self-exclusion**, **time limit setting, monetary limit setting, and cashless, card-based gambling programs**. **Self-exclusion** was the only strategy with enough evidence to be recommended but with inherent challenges including that the individual is predominantly responsible for regulation, as many venues do not strictly enforce self-exclusion consequences, and frequent breaching has been reported. However, while most self-excluders returned to gambling following the expiry of their self-exclusion,

a reduction in problematic gambling behaviours and other negative experiences was reported by gamblers and were maintained up to one year later. Another common strategy in this review, **time limit setting,** tended to be used more by problem gamblers than other gamblers, and this strategy generally relied on the individual to keep track of time; however, some studies also employed reminders in the form of pop-up messages on-screen. Setting a **monetary limit** was common and more highly endorsed, with at least 50% of both problem and non-problem gamblers reporting use in all studies except one. Problem gamblers were more likely to set a limit than non-problem gamblers, and those who set a monetary deposit limit reduced their overall gambling activity, but not the overall amount they wagered per bet. Unfortunately, problem gamblers were significantly more likely to exceed any self-imposed limits, **both time and monetary. Cashless, card-based** EGM gambling programs represent a strategy that has integrated both industry and individual elements, however no evidence exists as yet to prove any benefit. Only one study was found that examined self-exclusion programs in Internet-based gambling, finding that those gambling online were significantly less likely to seek out self-exclusion programs than land-based gamblers. Other strategies in the review (such as leaving credit or ATM cards at home, withdrawing a set amount of cash to play with, using a bank meter to remove a portion of winnings from game play, etc.) did not have sufficient evidence on the use and effectiveness of these strategies to make recommendations on their usefulness.

The role of **self-exclusion** was evaluated within a study (Kotter et al., 2017) to investigate the role of voluntariness of exclusion for the first time, and on general gambling behaviour of excluded individuals before and after exclusion. The study involved a retrospective online survey or interview up to 8 years after enrolment, finding that approximately 21% of excluders stopped all gambling activities and another 67% reduced their gambling. Gambling at 'gambling halls' (EGMs) showed the least decline in both self- and forced exclusion groups. The authors concluded that self- and forced exclusion are similarly useful in reducing gambling behaviour, even in non-excluded segments of venues. However, given that gambling was unchanged in 'gambling halls', it may be important to implement consistent exclusion programs across all gambling segments.

A systematic review **industry-implemented or environmental-level strategies** (Tanner et al., 2017) focused on strategies implemented by industry or regulators which are generally governed by policies and are not optional or chosen by the individual gambler (27 studies). This review included strategies such as **dynamic warning, pop-up, or other messages on EGMs; mandatory limit setting, mandatory cash-out, jackpot expiry, and regulations on winnings**; **imposed bet limits and reducing maximum lines to play on EGMs**; **removal of large note acceptors on EGMs and ATMs from venues**; **mandatory shut-down of EGMs or reduced operating hours; on-screen clock, and cash display rather than credits on EGMs; and environment restrictions such as caps on number of EGMs and smoking bans.** Many studies did not include pre- and post-measurement or control groups, and most relied on retrospective self-report. The most promising strategies to reduce harm from gambling included: pop-up messages; $1 maximum bets; removal of large bill acceptors and ATMs; reduced operating hours; clock and cash displays; and smoking bans. These strategies demonstrated some effectiveness in reducing both the amount of time spent gambling and the amount of money gamblers spend. While firm conclusions could not be drawn due to the lack of confidence in the evidence, the findings at least support continued use and further development of these industry-implemented strategies to reduce gambling-related harm.

A review of **harm minimisation tools for electronic gambling** (Harris and Griffiths, 2017) evaluated the effectiveness of RG strategies in within-session electronic or online gambling, including strategies such as: **enforced breaks, messaging (static messaging vs dynamic messaging; informative messaging; self-appraisal messaging; monetary and time-based pop-up messaging; normative feedback and enhanced messaging), limit-setting, behavioural tracking tools, and removal/modification of note acceptors**. Enforced breaks with accompanying messaging may be beneficial, but as a standalone strategy, may have unintended effects. Informative message content aimed at dispelling cognitive biases and erroneous cognitions appeared to be most effective – self-appraisal messaging (compared to informative messaging alone) had a greater effect on self-reported thoughts, behaviour, and awareness of the amount of time spent gambling. No effects on behaviour were observed, and it is unclear as to whether it is the message content itself, or the break in play offered by the message, that exerts the behavioural influence (or whether the two in combination provide an additive effect). Overall, effects of messaging were reported to be small, and impact upon the majority who gamble at low or moderate levels is unknown. The authors proposed alternatives to current approaches including emotional imagery. For limit setting, evidence was inconclusive and may have potential unintended effects such as inadvertently causing gamblers to gamble larger sums of money to compensate for the shorter session duration set. Behavioural tracking tools that feedback to players the amount of time spent gambling relative to normative data, showed promise – in particular, colour-coded feedback systems informing players of their level of risk. Behavioural tracking systems were considered to have potential long-term benefits, particularly for low-moderate risk gamblers.

A randomised comparison study and a systematic review by Ginley and colleagues **assessed the impact of gambling warning messages on gambling play and harm minimisation**. Similar to the experience in tobacco products, warning messages influence knowledge and beliefs as well as lead to long-term recognition of the potential consequences related to a range of high-risk health behaviours. The individual study (Ginley et al., 2016) aimed to ascertain **how the experiences of winning and losing influences how warning messages were received and their impact**. It was found that those who received warning messages while winning made the fewest spins and did not increase their bet rate, compared to all other conditions. Players who received warning messages while losing decreased their bet size compared to those who received messages while winning. Despite receiving warning messages, losing players did not decrease their number of spins or bet rate. In summary, winning or losing during play appears to affect the impact of a warning message – a message may encourage a winning gambler to stop play, but the same message for a losing gambler may offer a small minimisation in harm by helping them to decrease bet size, though not their rate of betting.

The systematic review (Ginley et al., 2017) **evaluated gambling-related warning messages** (31 studies) and discussed public policy implications. A considerable body of research was found that supports the efficacy of messages to warn about the risks associated with gambling. It was found that if EGM messages were applied appropriately, they potentially reduced harm by informing consumers and produced modest changes in behaviour. Effects in other wagering environments, including Internet gambling, had modest negative effects on the gambling experience. A range of factors were all found to influence the impact of messages: Placement – messages had optimal impact when they popped-up on the centre screen, interrupted play, were interactive or required active removal by the player, and messages simply posted on walls or machines had limited impact;

Content – messages were more effective at modifying behaviour when they were brief, easy to read, and direct); Framing – encouraging the gambler to reflect on their gambling tended to influence behaviour, and; Context – ideally messages would be sensitive to the dynamics of a gambling session, e.g. whether the gambler is winning or losing, consuming alcohol, or when a jackpot is available. The authors conclude by emphasising the value in warning messages on EGMs as a regulatory strategy, based on the low cost for benefit demonstrated in this literature, as well as successful regulatory implementation of jurisdictions in Australia, New Zealand and other countries.

Messaging on EGMs was evaluated in New Zealand (Palmer du Preez et al., 2016) in a study examining gambler engagement with pop-up messages, gambler views, and the relationship between pop-up messages and EGM expenditure. Since 2009, New Zealand law requires pop-up messages to interrupt gamblers at irregular intervals not exceeding 30 min of continuous gambling, informing the gambler of the duration of the current session, mount of money spent, and net wins or losses. Participants included anyone who had used EGM in the past 6 months. Nearly a quarter of participants were classified as low-risk gamblers, and fewer were moderate-risk or problem gamblers. A modest harm minimisation effect of the pop-up message feature was found – more than half of participants reported a familiarity with pop-up messages, and attending to them, together with a belief that they were useful in controlling expenditure. The majority also reported they were unlikely to end a gambling session after a pop-up message. The study was limited in that no direct message was given to the gambler, rather, information on the current gambling session was displayed on screen, and messages neither explicitly encouraged nor discouraged extending the break from gambling. Further, the default outcome of pop-up messages, assuming no gambler input, was to continue gambling, so the gambler was not in fact required to make a choice, nor attend to the information. It was therefore concluded that to reduce harm, pop-up messages could more explicitly encourage gamblers to stop gambling in that session (self-appraisal), as opposed to 'softer' more general cognitions around considering or reducing overall gambling levels.

A simulated **digital slot machine accelerator was evaluated** (Broussard and Wulfert, 2017) to determine if it would decrease persistence in play, relative to comparison/control groups receiving either an educational handout describing probabilities and concepts related to slot machine gambling; or a handout unrelated to gambling. Exposure to either the accelerator or educational handout decreased participants' judgments of the probability of winning, and participants using the accelerator played significantly fewer trials on the slot machine than controls, suggesting that advanced gambling simulations may be a potential prevention tool.

A systematic review evaluated **personalised feedback interventions** as an intervention and prevention method for gambling behaviours (Marchica and Derevensky, 2016). Studies were included if they reported on gambling prevention and/or reduction (6 studies). Personalized feedback intervention is a brief intervention used to alter behaviour by providing the individual with a key discrepancy between perceived and actual norms, to provide a context within which an individual can self-evaluate their own behaviour. The assumption is that when norms are salient, individuals try to resolve the discrepancy by modifying their own beliefs and behaviours toward the norm. The review found that personalised feedback treatment groups showed decreases in a variety of gambling behaviours, and perceived norms on gambling behaviours decreased significantly after interventions. It was concluded that problematic gamblers appear to benefit from programs incorporating personalised feedback interventions, and it may be a promising secondary prevention

strategy for individuals displaying at-risk gambling behaviours. The authors considered that personalised feedback interventions represented a scalable and relatively inexpensive intervention method.

Another study examined the impact of **personalised feedback for online gamblers** (Auer and Griffiths, 2016) by comparing three types of information (i.e., personalised behavioural feedback, normative feedback, and/or a recommendation) on gambling behaviours (theoretical loss amount of money wagered, and net win/loss) in an online platform. By manipulating the three forms of information, data were analysed from six different groups of online players, which included gamblers who had a net loss across all games in the past month, and oversampling of high intensity gamblers in order to detect change in behaviour in response to the type of information. Personalised information related to the player's gambling behaviour in the form of numbers and illustrations; normative feedback was in the form of numbers and illustrations displaying the gambling intensity of the average active player compared to their own; and the recommendation was in the form of written information about using responsible gaming tools to gamble more responsibly. It was found that personalised behavioural feedback can enable behavioural change in online gambling; but that normative feedback does not appear change behaviour significantly more than personalised feedback alone.

A qualitative study **investigated ways to introduce a RG pre-commitment system for EGMs** (Gainsbury et al., 2018) to maximise their perceived value and subsequent uptake, through focus groups with gamblers. This is a useful example of evidence to inform implementation to enhance uptake and use, which is critically necessary for effectiveness. In this case, it was noted that often regulatory development includes public consultation at conceptual stages, but then fails to include end-users in the creation and implementation of such tools. This research was led by a researcher receiving industry funding, and therefore should be used with caution. Gamblers were included in the study if they played EGMs at least every two weeks. One group of low-risk gamblers, two groups of medium-risk gamblers, and two groups of problem gamblers, were involved. Participants were asked their perspectives of a pre-commitment system (features including accessing activity statements, setting limits, viewing dynamic messages, taking breaks), including concerns, and how to enhance perceived value and usefulness. Gamblers reported positive attitudes generally, but many perceived it as relevant only to problem gamblers. Misconceptions about the aim and intended audience of the tools emerged, indicating that this would impact their likely uptake and use of the system. Participants indicated that value could be enhanced by making the system flexible and customisable, but still easy to use. Privacy and stigma concerns emerged, so educational efforts may help to address gamblers' concerns. Applying findings such as these during implementation of RG tools would likely enhance user perception of harm-minimization tools as relevant and may subsequently enhance effectiveness.

Gambling environment design and policy

A useful narrative review addressed an important exposure in the **environment in which a player interacts with gambling machines** (Adams and Wiles, 2017) that is, the rooms and the venues in which gambling machines are positioned. By examining common layouts that gamblers are exposed to, it was identified that venues are divided into two main areas: one for the main social activities of the venue (the "main hall") and the other a partitioned area (the "annex") where machines are tightly clumped in ways that discourage social interaction (for example by having no tables to

socialize around, dimmed lighting and entry pathways that minimize scrutiny). The findings suggested that the 'annex' layout of venues is a main enabling space that promotes a style of play more oriented towards problematic gambling. As such, the authors advocate for further effort in some key areas: (1) research, by expanding studies beyond players and machines to the broader venue environment; (2) regulations, including (a) those that could reduce the capacity of these spaces to enable excessive solitary gambling and promote gambler visibility; (b) on sensory features (sounds, lighting) in the addictive psychological space (labelled the 'zone'); and (c) on access-ways, together with further research on the role of anonymous entrance and exit from/to annexes and gambling harm. The authors questioned when this type of environment design becomes of sufficient concern to find ways of changing venue configurations, and the role for policy and legislation in reshaping venues so that they are less conducive to problem gambling.

Also in the gambling environment, **responsible gambling codes of conduct (CoC)** were evaluated in Melbourne, Australia (Rintoul et al., 2017) to understand the extent of adherence to the CoC – which aim to support RG and discourage harmful, intensive and extended gambling. Through a comprehensive review of EGM operator statements/documents; structured observations in EGM venues; and interviews with gamblers (mostly high- and moderate-risk) and with professionals, a general lack of harm minimisation intervention in venue self-regulation was found. While venues were generally compliant with passive RG strategies described in CoCs (e.g. display of signage, provision of information about the venue self-exclusion program, and where to seek help) compliance with active strategies involving a response to signs of gambling problems was often lacking. Only isolated evidence was found of supportive interactions between staff and gamblers to address harm. Overall, venues tended to fail to respond to signs of gambling problems – and instead, encouraged continued gambling – which contradicts CoC responsibilities. Signs of gambling problems were a normalised feature of EGM use in these venues. Breaches of self-exclusion by venue staff were common. The lack of limits on electronic funds withdrawals (via EFTPOS) at venues was also raised. The authors argued that improved consumer protection for gamblers could be achieved through legislation, which requires venues to respond to signs of gambling problems. Examples of action may include banning food and beverage service at machines, limiting cash withdrawals, and use of behavioural tracking algorithms to identify problematic gambling patterns, together with binding universal pre-commitment systems. Such upstream (preventive) measures like EGM modification using pre-commitment technology have been implemented in Norway's regulatory system, with demonstrated reductions in expenditure and gambling problems.

Implementation of **online responsible gambling (RG) practices** was examined (Bonello and Griffiths, 2017) on the 50 most advertised online gambling operators worldwide, to understand the kinds of RG practices offered to minimise harm. Some of the popular RG tools include setting limits on the amount of money or time and self-exclusion. This research was connected to industry associations and funding, and therefore the conflict of interest may impact upon interpretation of findings and should be used with caution. RG information was generally consistent across online gambling operations, yet one-third did not display information about the 18+ years age restriction at the account registration phase. All sent gamblers commercial communication via e-mail, but less than half actually contained any RG information. RG tools offered were inconsistent online and in other communications with the operators. Further recommendations were provided for online operators to support RG practices (which can be found in the final concluding remarks of the article).

Workplace setting

A study protocol described a **problem gambling prevention initiative in the workplace setting** (Rafi et al., 2017), via management and employees across ten organisations in a range of industries, including various labour including manual, office and education. The study protocol aims to focus on workplace policy and skill development, yet explicitly theory or evidence informing the approach was not described. Intervention outcomes will be focused on changes in managerial-staff discussions about gambling and staff referrals for early intervention. While no results are available yet, the authors suggest that this research is the first large-scale study of its kind to evaluate a preventive intervention for PG in a workplace setting.

A review of measures to **prevent and manage gambling-related harm in the workplace** (Binde, 2016), was combined with interviews of professionals and recovered problem gamblers in Sweden. Strategies described from the combined review findings and interview themes included substance use and gambling policy, problem gambling awareness, attention to signs of gambling-related harm and control functions (appropriate responses to harmful gambling and rehabilitation were also discussed which is beyond the scope of our review update). While evidence of effectiveness was not explicitly presented, potential workplace strategies were discussed together with annotations of supporting literature, or experiential feedback from the qualitative method. Workplace substance use and gambling policy was suggested as a useful way to encourage colleagues to identify and support colleagues with a gambling problem (who are likely to notice earlier than management), and policy templates from the literature review were noted. No awareness strategies were described from the literature reviewed. Attention to signs of problem gambling were described in terms of commonly-used checklists that may be adopted to identify employees with gambling problems affecting their work. Control functions were linked to policy, and included the simple rule that gambling is not allowed at work, for which supporting literature was presented. The author concluded that employers should be supported and encouraged to engage in preventive efforts, for example, by public health agencies, employers' associations and trade unions; with strategies ideally integrated into more general jurisdictional policy to prevent problem gambling, including regulation of gambling, legislation and health care. It was acknowledged that uncertainty about legal responsibilities may make employers hesitant to implement workplace policy, therefore was emphasised that broader labour policy needed also to be supportive.

Interventions for strengthening community action or capacity building

Process evaluation results from two public health programs implemented nationwide were reported in New Zealand (Kolandai-Matchett et al., 2018) as part of implementation of a national public health strategic plan (noted in our previous review). Encouragingly, the programs – 'Aware Communities', and 'Supportive Communities' – were community-action based. Aware Communities' aimed to build community awareness of gambling harms through public debate, media discussions, culturally relevant community-led campaigns and community education; and 'Supportive Communities' aimed to build community resiliency and enhance social protective factors (e.g. community connectedness, cultural identity) through health promotion, education and awareness raising collaboratively with stakeholder groups (e.g. social services, community groups). Recommended activities for both programs were generally information and education, for example, media engagement, public discussion facilitation, and community engagement, and targeted the

general population and at-risk communities disproportionately affected by gambling harms. The mixed-methods process evaluation used document review (progress reports), survey and focus group interview, demonstrating capacity to achieve expected outcomes (e.g. enhanced community awareness about harmful gambling), enhance social sustainability (e.g. established trustful relationships at the community level) and achieve some program sustainability (e.g. community ownership over ongoing programme delivery). Outcomes evaluation will be necessary to determine the degree of harm-minimisation resulting from these programs.

A review of health promotion literature aimed to build upon the evidence-base available to address **Indigenous gambling issues through health promotion** (Fogarty et al., 2018). While the evidence reviewed was quite general and did not produce new knowledge on intervention effectiveness, some valuable case studies were provided of ongoing Indigenous community gambling initiatives in Australia which adopt health promotion principles: Amity Community Services (Northern Territory), Warruwi Gambling Help (New South Wales) and the Bidyadanga Gambling Diversion programme (Western Australia). These may be useful exemplars for future practice, although evaluation status is unknown. Types of strategies included developing skills at an individual and community level, engaging community, education workshops, phone counselling services, websites and online forums to provide support, information and referrals to gambling help professionals, cultural support, and training and direction for gambling counselling services, community services and government organisations. To some degree, some of the programs also involved reorienting of health and support services to integrate communication or assessment about gambling risk.

In a research summary, GREO reported on a community-based knowledge translation project (GamblingResearchExchangeOntario, 2017a) to assess **informational needs and engage community in development of culturally-appropriate awareness-raising and help-seeking resources.** A research institute partnered with a community-based organisation to identify and meet the knowledge needs of the community (the "BET$15k" program). The researchers did focus groups to understand the community's needs (with South Asian Canadian gamblers, their family members, and healthcare providers working with this population); and then culturally-appropriate educational resources were created to increase awareness and facilitate help-seeking among this population. While specific evaluation outcomes of the process or outputs (awareness raising materials) were not reported, the model for community needs assessment and engagement may be useful for other projects. The partnership between the research institute and community organisation is likely to bring rigour and relevance to such an initiative – Research infrastructure (e.g., research ethics board expertise, research assistant hiring etc.) can support the community organization (SACHSS) in achieving the main deliverables of the project; and the community organisation's role was pivotal to ensuring participation from community members and health professionals. It was reported that the resources will continue to be sustained through dissemination and further development over time. A full report is available by request from GREO.

Interventions re-orienting health services toward prevention and promotion of health

One article in the search related to the primary care setting, where a study evaluated a **brief intervention to screen and provide referral to those considered problem gamblers** (Nehlin et al., 2016). Primary health care (PHC) centres in Sweden were selected, and staff (mostly nurses and social workers without prior experience of gambling or addiction training) were trained in a gambling behaviour screening and brief intervention process. Interviews with PHC centres also explored

feasibility and implementation issues. Overall, 81 % of those screened had spent money on lottery or other money-betting games during the past 12 months, and 6.3 % screened positive for problem gambling. Following screening, those with signs of problematic gambling were offered a return visit to discuss their gambling habits. The intervention was found to be most suitable for patients already known to the caregiver. While the authors felt that larger evaluations were required, it was concluded that primary care was a suitable setting for intervention, provided that staff are trained in brief intervention techniques for gambling and can properly carry out the intervention, preferably with patients they are familiar with.

Interventions for building healthy public policy

No articles related to population-level policy or legislation were retrieved in this updated search. Refer to "Supportive environments and products" for evaluations of implementation of regulatory responsible gambling strategies, e.g. adherence to EGM venue Codes of Conduct (Rintoul et al., 2017).

Discussion

It is encouraging that the literature has evolved in the two years between 2016 and 2018, relative to the initial search across ten years prior. The majority of articles were evaluative, reporting on either specific solutions (interventions/programs/strategies); and others were useful descriptive studies assessing risk and protective factors for gambling, particularly among children, focusing on social and structural determinants and influences (such as media, marketing and responsible gambling policies). In our initial review, more primary prevention interventions were found, while in this update (2016-18), many more targeted (secondary and tertiary) prevention interventions had been reported, focused on preventing and minimising harm among gamblers, in particular evaluations and reviews of responsible gambling strategies. Predominantly we found reviews and individual studies on **secondary (targeted) prevention strategies in gambling environments** (e.g. EGM venues), which provided some evidence of the effectiveness of particular responsible gambling strategies. We also found reviews and studies of **primary (universal) prevention delivered with young people** (e.g. educational programs in schools) in small-scale, short-term interventions, which generally confirmed our previous review findings.

Secondary and tertiary prevention strategies in gambling environments that have been the most studied include messaging on EGMs (dynamic/static, with a warning/information/self-appraisal, with or without personalised normative feedback); limit setting (monetary and time); and self-exclusion programs. There appears to be more promise in strategies implemented in products and gambling environments, than strategies depending upon individual control. To some extent, current evidence exists to support, to some extent: **behavioural tracking; RG machine features including dynamic messaging; limit setting; employee training; self-exclusion** (Ladouceur et al., 2017; Robillard, 2017; Drawson et al., 2017; Kotter et al., 2017; Harris and Griffiths, 2017; Tanner et al., 2017; Ginley et al., 2016; Ginley et al., 2017; Palmer du Preez et al., 2016). Evidence was also available to support **$1 maximum bets; removal of large bill acceptors and ATMs; reduced operating hours; clock and cash displays; and smoking bans in venues** (Tanner et al., 2017). Behavioural tracking tools including normative data feedback show small and short-term effects on behaviour change, and may be more effective for low- to moderate risk gamblers. Dynamic or 'Pop-up' messaging (containing self-appraisal messages, personalised normative feedback, or time/monetary reminders) have shown to

reduce size and frequency of bets, increased awareness, and greater breaks in play. Self-appraisal messaging (compared to informative messaging alone) appears to have a greater effect and tend to encourage gamblers to stop gambling in that session, as opposed to 'softer' more general cognitions around reducing overall gambling levels. A warning message can differently influence winning gamblers (may be encouraged to stop play) compared to losing gamblers (may decrease bet size but not rate of betting). It is still unclear whether the message content itself, or the break in play offered by the message, exerts the behavioural influence (or whether the two in combination provide an additive effect). Impact of messages upon the majority who gamble at low or moderate levels, is unknown. Limit setting evidence is mixed: Time limit setting tends to be used more by problem gamblers and generally relies on the individual to keep track. To determine effectiveness, it requires testing where time limits are mandatory. Potential unintended effects need consideration, as larger sums of money may be gambled to compensate for shorter session durations set. Monetary limit setting was more endorsed across the literature, and may reduce overall gambling activity, but not the overall amount wagered per bet. Problem gamblers appear more likely to set a monetary limit than non-problem gamblers, however may be more likely to exceed any self-imposed limits (both time and monetary). Some evidence suggests that limit-setting may be most effective if prompted before engaging in a gambling session and if set by the gamblers themselves (not by operators). Self-exclusion has sufficient evidence to be recommended in the short-term, while acknowledging the inherent challenges in that the individual is predominantly responsible for regulation, and that many venues do not strictly enforce self-exclusion consequences.

Other upstream measures to create supportive environments recommended by experts in the field include banning food and beverage service at EGMs, limiting cash withdrawals, and behavioural tracking, together with binding universal pre-commitment systems (Rintoul et al., 2017; Tanner et al., 2017). EGM features can be included together within a consumer protection framework, or incorporated into a single pre-commitment system (Rintoul and Thomas, 2017; Thomas, 2016).

Two articles related to **workplace initiatives for preventing gambling-related harm** were found, one was an ongoing prevention intervention involving workplace policy and individual skill development in Sweden (Rafi et al., 2017) and a review which discussed strategies including policy, problem gambling awareness, attention to signs of gambling-related harm and control functions (Binde, 2016). The workplace prevention initiative was a protocol for a rigorous evaluation using a cluster randomised comparison design, therefore the findings will be important to review in future.

Primary prevention interventions were generally all short-term programs evaluated with children and adolescents. Most programs either (1) aim to increase knowledge about gambling and modify misconceptions about gambling; or (2) includes the same information as the first type, and examines skills in the participants as well. Consistent with previous findings, weak evidence demonstrate that these strategies may produce short-term improvements in knowledge and attitudes towards gambling, but evidence is insufficient to determine impact upon gambling behaviour post-intervention and in the longer term (Kourgiantakis, 2016; Keen et al., 2017; Oh et al., 2017; Huic et al., 2017; Canale, 2016). Our confidence in the evidence remains limited by behaviour measurement challenges, short-term duration of evaluation, and a general lack of underpinning theory to inform program design. Most programs focused on individual personal skills, were universal and therefore did not target children of PG parents or other subgroups. One review suggested that further targeting around interpersonal relationships may be necessary, such as in family-focused prevention

(e.g. family strengthening programs) which the substance use literature has shown to be the most effective form of prevention in that field (Kourgiantakis, 2016). Interestingly, another youth program evaluation suggested that the program (a web-based intervention) might be more effective if targeted to students with the highest baseline levels of gambling frequency and/or symptoms of problem gambling (Canale, 2016). Together with the findings of the Kourgiantakis review, this may indicate a need for further tailoring of youth prevention programs, and more specific targeting of such programs, in order to achieve appropriate reach, dose and effectiveness.

Initiatives involving primary prevention and health promotion approaches, included two examples of community action from New Zealand (Kolandai-Matchett et al., 2018) and Australia (Fogarty et al., 2018). These process evaluations revealed useful context about the community engagement processes, important population groups included (Maori, and Aboriginal Australians) and types of strategies implemented. It will be important to follow any outcomes of evaluations of these initiatives. An example of community-engaged research to inform a community awareness campaign in Toronto (GamblingResearchExchangeOntario, 2017a) focused on culturally appropriate resources for problem gamblers, however evaluation outcomes were not available. A study in a primary health service setting in Sweden (Nehlin et al., 2016) suggests that brief intervention may be feasible and potentially useful for identifying people at risk of problem gambling.

Limitations

The confidence in, and usefulness of the evidence presented is limited by the methods used, which for time and resource reasons, included limits on databases searched, years of publication, lack of critical appraisal, and a non-systematic review process. Publication bias is a serious risk in the area of gambling-related harm prevention, where even academic research may be influenced by industry – therefore such research has been summarised but conflict declared accordingly.
The strength in this review is its practical relevance - while the search was not as comprehensive as it could have been, grey literature identified by handsearching, including government reports and research summaries, have been identified where relevant.

Current prevention strategies and public health frameworks

Harm from gambling is known to impact individuals, families, organisations, and communities; and these harms are not limited to people engaging in problematic gambling. The challenge is to coordinate a suite of effective strategies that aim to prevent harm across all of these levels in society. To further understand the levels at which current interventions influence or operate, two well-established public health models were applied:

a) **Intervention strategy types** were categorised according to the **Ottawa charter for Health Promotion** (used to organise review findings), which may assist in making decisions about the types or components within a suite of strategies to prevent gambling-related harm and promote health
b) **Levels at which interventions influenced** was assessed using the **Socioecological model of health** (McLeroy et al., 1988; Victorian Responsible Gambling Foundation, 2015) to understand the strengths and gaps in the existing evidence base and point to areas for intervention.

Our main findings related to the public health frameworks are that;

a) The prevention strategies that have been evaluated still predominantly focus on changing **personal skills and knowledge** through programs and education. This suggests a need for a more comprehensive strategy that engages more of what health promotion has proven to be effective for a range of issues. Effective prevention involves multiple complementary strategies including policies, creating health-promoting environments (e.g. physical infrastructure, socio-cultural norms), community action, as well as support to individuals to make healthier choices easier. Underpinning such approaches is partnerships; and necessary system enablers include: leadership, governance and coordination; evidence, research/evaluation and monitoring; workforce capacity, funding and commitment.
b) The majority of prevention strategies mainly aim to **influence individuals,** and to a lesser extent, **organisations (gambling environments)** (**Table 2)** however the determinants of gambling are broader. An ecological approach views health and behaviour from multiple perspectives, including characteristics of the individual; influences of interpersonal networks such as peers and family; exposures in organisations and environments; communities; and policy and legislation environments. Further, considering action across the life-course, it appears that most of the universal prevention efforts target young people only, rather than whole populations, again indicating a missed opportunity in engaging whole communities in action to prevent harm. Implications are discussed further, below.

Table 2 Prevention strategies, categorised by level of intervention

Level of intervention	Examples of groups/target areas	Prevention strategies from evidence review
Individual	Individual knowledge, attitudes, beliefs, skills, behaviour, traits, genetic and personal experiences	7 reviews/studies on Gambling prevention programs for adolescents/young people (Oh et al., 2017); (Huic et al., 2017);(Kourgiantakis, 2016); (Canale, 2016); (Keen et al., 2017) (Drawson et al., 2017)(some crossover with gambling environments also); (Kotter et al., 2017) (RG self-exclusion programs)
Interpersonal, social	Formal and informal social networks, social support systems, family, workgroup and peers, friends; social groups who share social norms	
Organisational/ Institutional	Social and cultural institutions with organisational characteristics, formal/informal rules, regulations, policies for operation, that promote or constrain behaviour; physical and social environments where gambling occurs; Licensed venues such as clubs and pubs, technology e.g. online gaming	16 reviews/studies on effectiveness of responsible gambling tools/features in products and gambling environments (Auer and Griffiths, 2016; Adams and Wiles, 2017; Broussard and Wulfert, 2017; Gainsbury et al., 2018; Ginley et al., 2017; Ginley et al., 2016; Harris and Griffiths, 2017; Ladouceur et al., 2017; Marchica and Derevensky, 2016; Palmer du Preez et al., 2016; Robillard, 2017; Tanner et al., 2017); in online gambling (Bonello and Griffiths, 2017); in workplaces (Binde, 2016) (Rafi et al., 2017); in primary care (Nehlin et al., 2016)
Community, neighbourhood	Relationships/connections between organisations, institutions and networks within defined boundaries	3 reviews/research reports on community initiatives to prevent and minimise gambling-related harm (Fogarty et al., 2018; GamblingResearchExchangeOntario, 2017a; Kolandai-Matchett et al., 2018)
Societal, Policy	Local, state-wide or National policies and legislative environment that governs access to and availability of the means to gamble, and that regulates, supports or constrains healthy actions and practices; whole of population drivers	1 study examining adherence to regulatory codes of conduct for gambling venues (Rintoul et al., 2017)

Adapted from (McLeroy et al., 1988; Lynch, 2000; Victorian Responsible Gambling Foundation, 2015; Messerlian et al., 2005)

Implications for practice – general

- **Universal (primary prevention) interventions** show promise, and it may be beneficial to implement these as early as practical, to prevent misconceptions from developing. However, overall the evidence suggests that such programs clearly need more careful design and implementation to deliver any substantial public health impact. Few evaluated examples exist, and for those that have been evaluated, the approach must move beyond addressing only personal knowledge and skills, to include changes in social environments and policy where there are more pervasive determinants of gambling-related harm. Understanding and applying an established public health framework may more appropriately address prevention overall and for vulnerable populations. For example, it may be that whole populations are better served by other universal initiatives such as policy/legislation/regulation and social marketing (where cost-effective and equitable).
- **Targeted (secondary and tertiary prevention) interventions, may need to be better tailored, implemented and enforced** to reach the intended populations, demonstrate benefit, and ensure efficient use of such resources. Many of the responsible gambling features also **depend heavily on individual control and self-regulation**, which is problematic for the same reasons noted above. For example, time and monetary limits on EGMs requires that individuals decide their own limit as well as having to self-regulate adherence to those limits – these variations reduce the level of protection provided. The value of responsible gambling strategies is further undermined by inconsistent adherence to practice codes in gambling venues. It may therefore be necessary to incorporate such strategies into universal, binding pre-commitment technology.
- **Overall, prevention strategies require better design and tailoring to maximise effectiveness**. The overall lack of theoretical conceptualisation, particularly in educational program design was apparent (consistent with our previous review). To some extent this helps to explain the modest results achieved in youth programs. Some research suggested to focus on unprofitability experienced by users (e.g. expected value), and to connect new knowledge with existing knowledge and familiar experiences (for example most adolescents have not gambled inside a casino, but might be familiar with football tipping. As emphasised by other authors, program that is designed from sound theory, with conceptualisation of likely mechanisms of change, increases the likelihood of intended outcomes.
- **Promising interventions** (for which the strength of evidence is not yet sufficient) were identified, where benefit is more likely than harm – however strong theoretical underpinning, principles of public health practice and comprehensive evaluation should be applied in the absence of clear evidence of effectiveness (or cost-effectiveness). For example, self-exclusion from online venues could be a valuable strategy, as online gambling has been described as a riskier form of gambling.
- Considering the scope of strategies described against public health models, together with the evidence of effectiveness, we propose several challenges for prevention practice:
- **Although not a new challenge to public health, a broad range of prevention efforts are required to prevent harm along the prevention continuum**. Universal primary prevention programs are an essential component of any public health strategy, but need to be carefully designed and tailored to maximise effectiveness. Selective/secondary prevention initiatives may better target those at greater risk of gambling-related harm, but must be balanced with efforts to prevent harm from occurring in the broader population and protect exposure to

vulnerable groups like children. This presents a trade-off in allocating resources to broad, population-based prevention versus targeted strategies in gambling settings with subgroups. This can be likened to the response when a submerged rock pierces a hole in the bottom of a boat: We don't attend solely to those who have been injured, we also focus on stemming the flow of water through the hole (Adams et al., 2009). A useful list of additional primary, secondary and tertiary prevention strategies was proposed some years ago which may be worth revisiting together with current evidence (Blaszczynski, 2001).

- The overall narrow focus on personal skills and control in current interventions is likely to limit the effectiveness and sustainability of current prevention efforts. **A multi-strategy public health approach** would include existing strategies in a more coordinated effort to engage community action (e.g. community-wide initiatives); create supportive environments (e.g. change sociocultural norms, integrated workplace health and safety); and implement stronger policy and regulation (e.g. advertising bans). Such health promotion strategies would support individuals to make healthier choices easier. This will also help to protect vulnerable groups (e.g. children) and prevent harmful exposure before it occurs.
- While interventions operate predominantly at the individual level (e.g. youth knowledge and skills), and to some extent organisational levels (e.g. EGM product features), **impact upon harm-prevention across the larger population who do not gamble, and/or who gamble at low-risk levels, could be augmented with a more comprehensive public health approach that moves beyond individual behaviour**. Successful public health strategy cannot focus solely on individual gamblers, but also needs to encompass products, environments and marketing and the wider context in which gambling occurs. Restrictions on, or interventions related to, any of these aspects can form part of a balanced approach, and there is likely to be value in producing a small improvement to a large population.
- **A clearer framework for preventing gambling-related harm may be useful for both practice and research.** Others have advocated for a combined harm minimisation and consumer protection approach to gambling (i.e. providing gamblers with the tools to control their gambling, and regulating gambling availability) (Wynne 2009 in (Tanner et al., 2017)). Harm minimisation focuses on gamblers – this implies a need for secondary and tertiary prevention strategies to reduce potential for harm once gambling has commenced (Blaszczynski, 2001). In contrast, consumer protection targets entire consumer groups, and assigns the responsibility to policy and regulators – this implies that gambling is inherently dangerous and that all individuals need protection. Korn and Shaffer suggested that a public health approach should include preventing harm in individuals and groups who are most susceptible; protecting vulnerable groups from harm; and promoting balanced and informed policies towards gambling and people who gamble (Korn and Shaffer, 1999). The gap in evidence reviewed here suggests an opportunity to include health promotion strategies in future primary prevention approaches. Adams and colleagues (Adams et al., 2009) argue for responses to be balanced with equal efforts in developing public health responses that tackle the wider implications of gambling expansion: harm reduction; health promotion to focus upon community capacity and resilience to the attractions of gambling; and action on the political determinants to increase accountability, and reduce the conflicts of interest influencing governments in managing their gambling environments.

Implications for practice – specific to the PPP

- The gaps in the existing evidence suggest that the current Prevention Partnerships Program is a novel approach and, to our knowledge, represents one of very few attempts to enhance community-based action and influence beyond individual and interpersonal factors, to organisational/institutional and community factors
- The effectiveness of the PPP, and our understanding of its impact, could be augmented through longer-term repeated measures collected systematically – this would also enable us to contribute to the international evidence base

Implications for research and gaps identified:

- **At present the evidence base** represents a range of attempts to test effectiveness of small-scale educational behavioural programs in fairly controlled settings, and responsible gambling strategies mainly in 'laboratory' style studies. The challenge for the applicability (feasibility) of the educational programs and transferability (generalisation) of overall findings generally, is that interventions tend to operate in isolation of the broader context where a range of influences on gambling intentions or behaviour exist. Understanding research priorities from a community practice and public policy perspective may assist in addressing current gaps and guiding future research agendas
- **Research gaps** suggested in recent research included: interpersonal interventions, such as parent problem gambling, to reduce risks and increasing protective factors in children and families; and workplace initiatives to create policy environments that prevent gambling behaviour from becoming normalised. In terms of responsible gambling features, limit setting and staff responses to gambling appear to be the least studied, together with RG for Internet-based gambling. Examining gambling environments in more detail is also needed, considering the exposures at play – while industry research looks for ways that venues can engage and retain EGM gamblers, research from an ecological/social model of health and wellbeing perspective can consider how venue design might *reduce* gambling-related harm
- Methodologically, it was apparent particularly in the reviews of behavioural program evaluations that the measurement challenges and heterogeneity of studies often presented meta-analysis of collective outcomes, and some authors noted that the RG research field remains without a systematic approach for evaluating the body of evidence
- **Evaluations of primary prevention programs require careful design**. The true impact of interventions is unlikely to be demonstrable within the short-term nature of current research projects, especially considering the difficulties in detecting behavioural change in whole populations where relatively small numbers gamble at problematic levels, and where large reductions in gambling frequency would not be expected. Large sample sizes would be needed to detect small but significant reductions in gambling problems, and/or, empirically-supported proxy measures of meaningful change are required to contribute new knowledge to the evidence base. Such metrics may be challenging to identify – cautions from some of the studies reviewed that studies <u>should not</u> use cognitive measures as proxies for harm, as these may represent mechanisms for problematic behaviour (process) but are not conceptually the same as the consequences of negative impacts (harm). Overall, studies in this review have a suggested need to move away from diagnostic criteria of gambling pathology and toward measures of gambling-related harm – for example for younger populations, researchers have advocated for future evaluations to measure reductions in

harm, not frequency or expenditure which are typically very low, and unreliable; and to conduct follow-up assessments into adulthood or time of legal age.

Implications common to research and practice

- **The conceptualisation of prevention approaches in the current literature could be improved** in its sophistication of applied public health principles, to better inform future public health practice and research. The need to improve targeting of secondary (and tertiary) prevention was articulated, but was generalised in how prevention was framed. For example, some articles suggested that **universal prevention** strategies "are aimed at youth, regardless of risk or gambling status" (Ladouceur et al., 2017)(Keen et al., 2017). While this is accurate to some extent, it ignores that universal prevention can be applied to any age-group, or whole communities, not just children and young people. Universal prevention strategies are generally delivered without prior screening (e.g. anti-drunk driving campaigns), are intended for whole populations, to provide support before problems occur. In contrast, targeted prevention strategies are intended for at higher-than-average risk populations for a particular issue and those who display early signs of a problem (e.g. dropout prevention with students failing classes).
- **The extent to which current practice is evaluated would benefit from greater attention and investment**. Research-practice relationships may help foster mutually-beneficial partnerships for evaluations, so that the lessons learned in current community projects can be applied more broadly. The one example we found of a dedicated research-practice partnership (a gambling community-awareness raising initiative in Toronto) showed great promise and practical feasibility, so there is a wonderful opportunity to 'lead the way' in practice-based evidence generation, through rigorous research/evaluation. Dedicated stakeholder engagement, leadership from funding organisations, and integrated knowledge translation strategies could be used to facilitate partnership research/evaluation and co-create stronger evidence about program impact.

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Appendices

Appendix 1: Articles reviewed at a glance, categorized by type of prevention

Primary prevention/	**Secondary prevention/**	**Tertiary prevention/**
Universal	**Selective**	**Indicated**
Huic et al. 2017: Evaluation of a Croatian **school-based youth gambling prevention program** "Who really wins?"	Adams and Wiles 2017: **Review** of spatial contexts and **layouts of EGM venues and the impact on gambling**	Auer and Griffiths 2016: Study on the effectiveness of **personalised feedback for regular online gamblers**
Keen et al. 2017: **Systematic review** of **school-based gambling education programs**.*	Bonello and Griffiths 2017: Evaluation of **responsible gambling strategies** offered by online gambling operators to minimise harm	Binde P 2016: Review of **measures to prevent and respond to gambling-related harm and crime in the workplace**
Kolandai-Matchett et al. 2018: Evaluation of effectiveness of **two public health programs** in NZ for preventing and minimising gambling harm (Aware Communities and Supportive Communities)**Also secondary/selective*	Broussard and Wulfert 2017: Evaluation of a **digital slot machine accelorator** intervention	Gainsbury et al. 2018: Qualitative study to explore **gamblers' perspectives on harm minimisation strategies and tools** for EGMs
Kourgiantakis et al 2016: **Systematic review** to identify **problem gambling prevention programs** for children, examining the types of prevention used and whether programs target specific subgroups	Drawson et al. 2017: Review of evidence on **effectiveness of protective behavioural strategies** in gambling	GamblingResearchExchangeOntario 2017: **Knowledge needs assessment and awareness and help-seeking** for problem gamblers, their family members, and health professionals.
Canale et al 2016: Controlled study to test the efficacy of a **web-based gambling intervention program** for students within a high school-based setting	Fogarty et al. 2018: **Review** of **health promotion approaches with Australian Indigenous communities** for gambling-based initiatives	Kotter et al. 2017: study on **impact of self-exclusion programs** on gambling behaviour
Oh et al. 2017**: Review** of effective **educational-based programs** for preventing adolescent problem gambling	Ginley et al. 2016: Study to evaluate the impact of **warning messages** on gambling play and harm minimisation	Marchica and Derevensky 2016: Review of **Personalised feedback interventions**
	Ginley et al. 2017: **Systematic review** of gambling-related **warning messages** and to discuss the public policy implications	Nehlin et al. 2016: **Brief Intervention model tested in a primary care setting** to screen for at-risk gambling
	Harris and Griffiths 2017: **Review** of **harm-minimisation tool**s and critical review of their efficacy, on influencing gambling cognitions and behaviour	
	Ladouceur et al 2017 **Review** of effectiveness of **responsible gambling methods in gambling environments**	
	Palmer du Preez et al. 2016: Study on gambler engagement with **pop up harm minimisation messages** on EGM's and their effect on expenditure	
	Rafi et al. 2017: Protocol for a study to evaluate a **preventive intervention for problem gambling in a workplace** setting	
	Rintoul et al. 2017: Evaluation of **EGM venue adherence to Codes of Conduct** for responsible gambling	
	Robillard 2017: **Evidence summary on responsible gambling programs and tools** available and their effectiveness	
	Tanner et al. 2017: **Review** of **industry-implemented or environmental- level responsible gambling strategies** for harm	

	minimisation	

Appendix 2: Search strategies

Search 1 – peer reviewed literature

1. Medline [19 April 2018]

- (("public health".ab. or "public health".ti. or "health promotion".ab. or "health promotion".ti. or "primary prevention".ab. or "primary prevention".ti. or "population health".ab. or "population health".ti. or prevent*.mp. or "harm minimization".ab. or "harm minimization".ti. or "harm minimisation".ab. or "harm minimisation".ti.) and ("gambling related harm".ab. or "gambling related harm".ti. or gambl*.ab. or gambl*.ti. or "Responsible gambling".ab. or "Responsible gambling".ti. or Pokie*.ab. or Pokie*.ti. or Lotter*.ab. or Lotter*.ti. or betting.ab. or betting.ti. or wager.ab. or wager.ti.)) not treatment.ab. not treatment.ti.
- Limits: English language;
- Dates: 2016 – current

2. Gambling Research Exchange Ontario http://www.greo.ca/en/index.aspx [6 April 2018]

- Phrase search: "primary prevention"

3. Health-evidence.org [18 April 2018]

- Advanced search: "Gambling AND prevention"
- Dates: from 2016

Title and Abstract screening – exclusion criteria:

1. Exclusion criteria:
    a. Not gambling related
    b. Not prevention
    c. Duplicate
2. Included in 2016 search
3. Is a duplicate of a record within the current search

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