

What is the evidence for harm minimisation measures in gambling venues?

Charles Livingstone, Angela Rintoul, Louise Francis
School of Public Health and Preventive Medicine
Monash University
Author contact: charles.livingstone@monash.edu

doi: 10.4225/50/558112A877C5D

Abstract

The use of electronic gambling machines (EGMs) in Australia and New Zealand constitutes the largest sector of the gambling industry. The costs arising from the harms of gambling detract significantly from its benefits, and in all Australian jurisdictions various policy measures have been implemented to reduce these harms. If successful, these would maximise the net benefits associated with EGM gambling. This article reviews the available evidence for a range of these practices, particularly those implemented within EGM venues via 'codes of practice'. These codes of practice are intended to give effect to the principles of 'responsible gambling' within EGM venues. These measures are: self-exclusion, signage, messages, interaction with gamblers, the removal of ATMs from gambling venues, and 'responsible gambling' assessed overall in a venue context. In addition, we review the evidence in support of two major recommendations of the Productivity Commission's 2010 report into gambling, pre-commitment and one-dollar maximum wagers. We conclude that there is a modest level of evidence supporting some measures, notably self-exclusion and, to a greater extent, the removal of ATMs. There is also some evidence that 'responsible gambling' measures have, *collectively*, reduced the harms associated with gambling. However, there is limited evidence to confirm the effectiveness of most individual 'responsible gambling' measures actually implemented in venues. Further, policy measures implemented outside the control of venues (such as ATM removal, reduction in bet limits, and the prohibition of smoking) appear to be associated with more significant effects, based on analysis of EGM revenue data in Victoria. The evidence for prospective measures is necessarily limited since the ultimate test is post-implementation efficacy, but there is growing evidence to suggest that pre-commitment, one-dollar maximum bets or other machine design changes may yield significantly more effective harm minimisation effects than in-venue practices such as signage or, indeed, self-exclusion. In considering evidence about the effects of existing or prospective measures it is important to emphasise that packages of measures might be more effective than single ones, and that an inability to confirm a statistically significant effect does not mean that no effect exists.

In Australia and New Zealand, poker machines or electronic gambling machines (EGMs) are a significant gambling form. In 2011-12, EGMs accounted for about \$10.9 billion, or 53 percent of Australia's total annual gambling expenditure of about \$20.05 billion (Government Statistician and Queensland Treasury and Trade 2014). In New Zealand, they accounted for \$896 million, or 39.9 percent of the 2013 total annual gambling expenditure of \$2.07 billion (Department of Internal Affairs 2014). Coupled with casinos, which also rely heavily on EGMs, total Australian EGM expenditure is in the range of \$12 billion per annum (Government Statistician and Queensland Treasury and Trade 2014). Poker machines are also believed to be the principal gambling mode for about 80 percent of those experiencing gambling problems. Amongst those who use EGMs once per week or more, 15 percent have a serious gambling problem and another 15 percent have a more moderate gambling problem (Productivity Commission 2010), defined by a score on a problem gambling

screen (usually either the Problem Gambling Severity Index (PGSI) or the South Oaks Gambling Screen (SOGS)).¹ Further, it is likely that problem gamblers contribute around 40 percent of EGM revenue, with another 20 percent contributed by moderate risk gamblers (Productivity Commission 2010).

Given these statistics, there has been some pressure on policy makers to address the harm associated with EGM gambling, and the possible fostering of this by exposure to widespread gambling opportunities at local levels (Markham et al. 2014). Thus, gambling policy was the subject of significant debate at a national political level between 2010 and 2013. This was heightened following the 2010 federal election, when the member for Denison, Andrew Wilkie, negotiated an arrangement to provide parliamentary support to the ALP with then Prime Minister Gillard.

Although Mr Wilkie originally sought the government's agreement to introduce a one-dollar maximum wager for Australian EGMs, adopting a Productivity Commission (2010) recommendation (Wilkie 2011), the government proposed to introduce a system of comprehensive technologically based pre-commitment. This was another key Productivity Commission recommendation. Pre-commitment systems are based on the proposition that gamblers will make more rational decisions about how much they wish to spend on gambling when they are not in the midst of a gambling session. Effective pre-commitment systems would have the capacity to 'lock' users out of the system (in a fully comprehensive system, at the jurisdictional level) once the pre-determined limit is reached. This proposition was met with considerable opposition from the gambling industry (Panichi 2013). Despite considerable public support for reform (McAllister 2014), it was not enacted and gambling policy remains the prerogative of the states. However, the Australian Government has entered the field of gambling regulation through the *Gambling Measures Act 2012*, and may revisit this in future.

Responsible Gambling

'Responsible gambling', is the general term used in Australia and elsewhere to refer to harm minimisation practices used in gambling venues and businesses. Blaszczynski et al. (2011, 568) report that the term has its origins in gambling businesses' reaction to public concern about the impacts of gambling, and note that 'there is considerable conceptual confusion surrounding the term 'responsible gambling''. Livingstone and Woolley (2006) argue that the term is limited by its lack of clear goals and terminological clarity. The concept could be construed as requiring the responsible provision of gambling services, as well as the responsible consumption of gambling by individuals. However, a contextual analysis indicates that 'responsible gambling' tends in practice to rely on individual responsibility.

For example, the Commonwealth *Gambling Measures Act 2012* (s.4) has the object of developing and implementing 'measures to encourage responsible gambling by all gamblers', rather than requiring a broader perspective including the responsible provision of gambling products and services. The Queensland definition includes some recognition of the importance of the gambling environment, but also highlights individual responsibility to make 'informed decisions': '[r]esponsible gambling occurs in a regulated environment where the potential for harm associated with gambling is minimised and people make informed decisions about their participation

¹ A PGSI score of 8 or more places a gambler in the problem category, and from 3 to 7 as a 'moderate risk' gambler.

in gambling’ (Department of Justice and Attorney-General 2013).

The Victorian Responsible Gambling Foundation defines responsible gambling in two ways: first as that accruing to individuals, who may enjoy gambling but are aware of its risks and ‘exercise control over their gambling activity’. For the broader community, including government and gambling operators, responsible gambling means responsibility for ‘generating awareness of the risks associated with gambling’ and ‘creating and promoting environments that prevent or minimise problem gambling’ (Victorian Responsible Gambling Foundation 2014)

The legislated definition of responsible gambling adopted in New Zealand places emphasis on the responsibility of gambling operators, rather than individuals. This definition is somewhat distinct from those operating in other jurisdictions in that it places considerable emphasis on gamblers’ rights, and the obligations of gambling operators to conduct their gambling operations ‘in a safe and secure environment’ and ‘without pressure or devices designed to encourage gambling at levels that may cause harm’. Under the Act, responsible gambling is not primarily about individual gamblers taking responsibility for their own actions (Department of Internal Affairs 2006).

Regardless of the definition, ‘responsible gambling’ is most commonly operationalised via the adoption of particular practices, generally enshrined in ‘codes of practice’, which:

- instruct staff and venue operators about monitoring the behaviour of gamblers,
- provide brochures and information cards,
- suggest breaks in gambling,
- advise gamblers about the option of self-exclusion, and
- implement certain environmental provisions (for example, by providing natural light and clocks in gambling areas).

Aspects of these codes of practice are often non-specific, open to local interpretation, and do not provide concrete support to consumers to gamble within limits. In particular, technological support for such decision-making by consumers, such as a comprehensive pre-commitment system, is frequently lacking (Clubs Australia Incorporated 2012; Office of Liquor Gaming and Racing 2012; Victorian Commission for Gambling and Liquor Regulation 2014).

Given the centrality of EGM gambling to the issues associated with problem gambling in Australia, this review focuses on harm minimisation strategies commonly enshrined in these codes of practice. There are other measures that can be adopted to minimise harm associated with EGMs, which will be considered in the concluding sections. This review, however, will focus on those associated with codes of practice, given that these have been a prominent approach to the issue of harm minimisation. This review thereby indirectly assesses the self-regulation approach as a whole.

Researchers have identified a lack of evidence supporting extant harm minimisation practices within Australasian (and other) gambling venues. For example, Blaszczyński (2001, 7, 5) commented that ‘there is a significant absence of credible research data on the effectiveness of specific interventions’ and ‘virtually no evidence to confirm their effectiveness’. The Australian Productivity Commission (1999) identified significant evidence gaps around these practices, as did Hing (2004).

This review identifies the way in which the net community benefits of gambling activity can be maximised. Benefits of gambling largely relate to the pleasure and

enjoyment derived by people engaging in this activity as a form of entertainment. At present, there is considerable harm associated with gambling, which significantly reduces the net benefit. Reducing or eliminating harm will allow the net benefits of gambling to increase accordingly. However, there is little clarity about how best to achieve this goal.

This review therefore focuses on the evidence base for existing practices. Accordingly, the measures scrutinized for this review are:

1. Self-exclusion: the practice of gamblers acting to prohibit themselves from gambling premises;
2. Signage: the provision of responsible gambling, self-exclusion and counselling-service information via signs, posters and notices within venues;
3. Messages: the provision of responsible gambling and related messages via EGM screens;
4. Identification and interaction with gamblers: the process of venue staff observing the behaviour of gamblers and intervening to (for example) suggest breaks in use, if specific gambler behaviour is identified;
5. Smart card technology and pre-commitment: use of smart cards as keys to access EGMs, together with technology to permit gamblers to set binding limits of money and/or time on their use of EGMs;
6. Removal of Automatic Teller Machines (ATMs) from gambling venues;
7. Responsible Gambling overall: any assessments of the effectiveness of responsible gambling packages or codes; and
8. Reduction in maximum bets.

We did not address some important structural characteristics of EGM games (such as the design of their reinforcement schedules, in-game features, or load-up limits). We did not address the efficacy of counselling services, given that these are usually provided externally to the gambling environment. Furthermore, such a review would constitute a distinct project. We did, however, address two key Productivity Commission recommendations that address EGM structural characteristics or the EGM operating environment.

Pre-commitment technology had not at the time of writing been implemented across any Australian jurisdiction, although this was a key recommendation of the Productivity Commission (2010). However, we have incorporated it in this review because venue or corporation based trials or systems have operated in Australia (Delfabbro 2012; Schottler Consulting 2009, 2010), typically as a requirement of loyalty card programs. It has also been made available in Nova Scotia (Canada), Norway, and most recently Sweden. A voluntary system of pre-commitment is due for implementation in Victoria by December 2015. Further, a venue-based voluntary pre-commitment system has been foreshadowed by the Commonwealth *Gambling Measures Act 2012*.

Reduction of EGM maximum bets to one dollar was also a Productivity Commission recommendation. Some research has been undertaken into this intervention (Blaszczynski et al. 2001) but no Australian jurisdiction has yet undertaken a trial of this measure, and no such trial has yet been proposed, nor has any jurisdiction proposed to introduce it. We have incorporated a discussion of this intervention, however, on the basis of the apparent effect of maximum bet reductions in Victoria, and on data from the UK, as well as the research referred to above.

Methods

We used a combination of search strategies to identify English language literature on gambling harm minimisation measures published between 1992 and March 2013, with some additional highly relevant papers published up to May 2014. The search identified papers addressing one or more of the venue-based harm minimisation measures specified above. Potential harm minimisation measures that relate to characteristics of the game or machine rather than of venues were excluded from this review. Such measures included game or machine-based structural modifications such as changes in reinforcement schedules, speed of play, sensory effects (for example, visual and auditory features), payment methods, reductions in betting limits, EGM-based inducements, game availability, or programmed game features.

We undertook an extensive search of the following electronic databases: CinahlPlus, Informit, Ovid, Medline, Proquest health and medical complete, PsychINFO, Sage reference online, and PubMed. We also reviewed the publications pages of several gambling research centres, government agencies and departments. In addition, we examined the bibliographies of sourced papers and relevant grey literature to capture additional studies not already identified. Appendix 1 provides details of the literature review strategy.

Assessment of study quality

We assessed the quality of studies included in this review by applying the following criteria:

- relationship of research questions to study design;
- overall rigour of study design; appropriateness of methodology and method;
- representativeness of the sample through assessment of sampling and recruitment methods;
- clarity of presentation and analysis;
- appropriateness and application of analytic method;
- appropriateness of comparison of results with those of other studies; and
- identification of potential conflicts of interest.

Importantly, we also determined whether the study assessed the actual effectiveness of interventions in reducing harm.

This was not a formal systematic review, but given the disparity of methods, data sources and study designs proliferating in the field of gambling studies, a hierarchy of evidence could not in our view reasonably be employed.

The results of this review are described thematically, according to the categories identified above.

Self-exclusion

Self-exclusion (SE) is a form of pre-commitment where people identifying a problem with their gambling are able to enter into an agreement with venues or other institutions to exclude themselves from gambling venues. It is common for these agreements to be at an individual venue or operator level. SE programs are not

preventive measures. They are overwhelmingly used by those with established gambling problems and, with some exceptions, are generally implemented at the behest of affected individuals (Williams et al. 2012).

A problem with SE programs is their low take-up rate among gamblers, particularly problem gamblers. Australia's Productivity Commission (2010) calculated that the take up rate for SE amongst problem gamblers was around 9–17 percent. However, Williams et al. (2012) report use of between 0.6–7 percent of problem gamblers in Canadian provinces in 2005, and a study from the Australian states of Victoria and South Australia reports use of 2.5–3.5 percent of problem gamblers (O'Neil et al. 2003).

We identified four studies addressing the effectiveness of SE programs; seven studies partially addressing effectiveness of SE programs; and eight papers or studies addressing components of SE programs (including SE profiling, literature reviews, or general discussion re SE). Two papers reviewed the evidence for SE effectiveness and made recommendations to improve it.

Our overall conclusion is that after operating in some jurisdictions for more than 25 years, there is modest evidence that SE programs are an effective intervention for changing individual (rather than population-wide) gambler behaviour and reducing gambling related harm (Ariyabuddhiphongs 2013; Gainsbury 2010, 2014; Williams et al. 2007; Williams et al. 2012). Overall, these studies are limited, and many incorporate sub-optimal study design and/or sampling or data collection issues. These limits also derive from the way in which SE programs operate in Australia, the United States and Canada. In all of these jurisdictions identification is not generally required to obtain admission to gambling venues. Thus, gamblers failing to observe their self-exclusion arrangements are unlikely to be detected (Gainsbury 2014).

The methodological limitations of the studies reviewed are significant enough to warrant treating the positive ratification of existing SE programs with some caution. Such limitations include:

- a lack of baseline data (Nelson et al. 2010);
- the study sample not being representative of SE population and/or not generalisable to other jurisdictions because of specific characteristics (such as a jurisdictional requirement for identification of patrons prior to admission to a gambling venue, or heavy penalties applying to venue management who admit excluded patrons) (Hayer and Meyer 2011; Ladouceur et al. 2000b; Nelson et al. 2010; Townshend 2007);
- lack of validated measurement instruments (Hayer and Meyer 2011; Ladouceur et al. 2000b; Townshend 2007);
- absence of control or comparison groups (Hayer and Meyer 2011; Ladouceur et al. 2000b; Ladouceur et al. 2007; Nelson et al. 2010; Townshend 2007); and
- possible unreliability associated with self-report (Hayer and Meyer 2011; Ladouceur et al. 2000b; Nelson et al. 2010; Townshend 2007).

A small number of studies have attempted to evaluate SE effectiveness (Ladouceur et al. 2000a; Ladouceur et al. 2007) and there are reviews by Gainsbury (2010, 2014) and Williams et al. (2012). However in the main, the literature largely describes the various intricacies of SE programs, profiles the SE gambler, identifies the motivations for exclusion, addresses the legal aspects of the programs, and/or seeks out the opinions and perceptions of researchers of gambling related harm, industry groups, venue employees, welfare groups and sometimes gamblers themselves.

Some of the difficulties with the evidence base for SE programs can be better understood by reference to a well-cited cross-sectional study (67 citations as at 6 May 2014 (Google Scholar)). Ladouceur et al. (2000b) report that ‘based on self-reported observation, 30 percent of the participants completely stopped gambling once enrolled in this program’. However, this self-reported ‘successful group’ is drawn from a subsample of 53 of the overall 220 study participants, and constitutes 16 individuals. The authors report that ‘a majority of participants (76%) were excluding themselves for the first time, 17% had already barred themselves once before, and 7% admitted to more than one prior self-exclusion’ (p. 456). Given this, drawing conclusions about the effectiveness of self-exclusion programs from these data is problematic.

Nonetheless, in a prominent article (Blaszczynski et al. 2007) arguing for self-exclusion to be a gateway to further treatment, it was argued that:

the most significant finding of this study was that 30% of the participants complied with their initial agreement and remained abstinent during their self-exclusion period.

Unfortunately only 16 (8 percent) of 220 overall participants in this study were able to report this. Further, as Blaszczynski et al. (2007) suggest in their criticism of O’Neill et al. (2003), ‘self-report accounts are unreliable’. No data were provided in Ladouceur et al. (2000b) reporting on the overall efficacy of SE amongst all participants in this study, and all data relating to the efficacy of SE among the subsample of previously self-excluded gamblers were self-reported.

Ladouceur et al. (2007) subsequently undertook a longitudinal study with gamblers who had self-excluded from a Quebec casino, for periods of time ranging from six months to two years. Over a two-year period the original cohort of 161 gamblers declined to 53. This study concluded that mean scores for negative consequences of gambling, the urge to gamble, and participants’ South Oaks Gambling Screen (SOGS) scores declined significantly over the period of the study. However, more than half of those still in an exclusion contract had breached that agreement or returned to a casino.

It is also likely, as Williams et al. (2012) observe, that SE is the formalisation of a natural path to recovery, or part of a process that occurs when a gambler has decided to stop gambling, given that ‘the subsequent behavioural changes...are not fundamentally different than what is observed in people presenting...to any form of gambling treatment’. The data provided by Ladouceur et al. (2007) around the benefits of SE within their cohort of self-excluded gamblers may be influenced by this effect; further, it is not possible to determine what occurred with the majority of gamblers (67 percent) who declined further participation in the study throughout its course. Indeed by 12 months, 48.5 percent of participants had left the study.

Williams et al (2007) observed that there is some evidence that the effectiveness of SE could be greater when combined with treatment and other support mechanisms (Delfabbro et al. 2012; Delfabbro 2012; Townshend 2007). There is modest evidence that single counselling and education sessions without self-exclusion may also reduce problem gamblers’ gambling expenditure and time spent gambling (Sani et al. 2005). There is, however, also evidence that gamblers who sign SE agreements or undertakings are predominantly driven by the reality of limited alternative initiatives to support the problem gambler (Cohen et al. 2011).

A number of studies show a high breach rate for SE gamblers – in the range of 50 percent (as noted by Ladouceur et al. 2007; Williams et al. 2012; Gainsbury 2014). Croucher et al. (2006) report much higher levels of breach or of gambling at non-

excluded venues (up to 80 percent, with between a third and half of gamblers reporting that they had gambled at a venue from which they were specifically excluded) (Croucher and Croucher 2005). Researchers commonly report a small volume of chronic repeat ‘offenders’ of their SE agreement (Cohen et al. 2011; Williams et al. 2012), with Croucher et al. (2006) reporting an average of ten breaches per gambler during the period of study. Steinberg and Velardo (2002, cited in Williams et al. 2012) reported an average of nine breaches per person amongst the group of self-excluded gamblers they studied. Other studies report multiple such breaches (O’Neil et al. 2003; Alberta Gaming and Liquor Commission 2007).

The high incidence of breaching is likely because, as previously noted, SE systems in Australia, the US and Canada rely on self-enforcement by gamblers and manual photographic recognition of self-excluded gamblers by venue staff, rather than on technologically based limits to access. Verlik (2008) reports that 81 percent of gamblers who had entered casinos during self-exclusion periods found it very easy to gain access, with fewer than half of these (48 percent) ever being recognised. Of the 300 self-excluded gamblers in this study, 151 had breached their self-exclusion agreements.

However, European SE programs, which frequently use a requirement for personal identification to be provided to gain entry to gambling venues, are seen as more efficient than those operating in Australia, Canada or the United States (Gainsbury 2014; Williams et al. 2012). In New Zealand, venues are subject to significant fines for allowing self-excluded gamblers to gamble on their premises, and this may have contributed to the effectiveness of that program. However, evidence to support this claim is not extensive (Gainsbury 2014; Townshend 2007). Recent reports indicate that the Auckland casino will introduce facial recognition software for this purpose (Fisher 2014). Williams et al. (2012), Ladouceur et al. (2007), O’Neill et al. (2003), and Gainsbury (2014) all identify issues around the effective identification of patrons as major difficulties in the enforcement of SE agreements between gamblers and venues. For example, Gainsbury (2014) recommends requiring all patrons of gambling venues to provide identification, to enable crosschecking against a database of self-excluded gamblers.

There is reasonable evidence that SE may present some protective value in containing and reducing harm amongst existing problem gamblers (summarised by Williams et al. 2012 and Gainsbury 2014). However, as with other responsible gambling practices, the evidence base could be greatly improved by better study designs, including more longitudinal studies, avoidance of self-reporting, development and use of validated instruments, improved sampling, use of comparison groups, collection of baseline data, and access to data derived from loyalty and pre-commitment systems.

Electronic jurisdiction-wide pre-commitment systems could also present an effective means of self-exclusion, by permitting gamblers to set a time-dependent non-revocable loss limit of \$0. This concept is discussed further below under pre-commitment.

Signage

We identified two papers addressing the effects of signage in gambling venues. Our general conclusion in relation to venue signage is that there is no evidence of effectiveness.

The studies examining signage did not assess its effectiveness in limiting harm, but instead assessed gamblers' level of awareness and recall of messages (Reid 2005; Hing 2004). However, there is evidence that signs in venues competed badly against signage or displays promoting gambling (Reid 2005) and were not seen as effective responsible gambling measures by venue patrons (Hing 2004).

'Intelligent' or dynamic warning messages on EGM may be a more effective mechanism to reduce harm by allowing gamblers to determine a message that resonates with them, and to develop their own messages. These have been suggested as an element of pre-commitment systems, and are separately discussed below.

Messages

We identified 17 studies addressing or partially addressing the behavior change effectiveness of messages. We identified four reports or reviews on messages as a form of responsible gambling. Such messages frequently involve advice about setting time or money limits, the actual odds of winning, and the desirability of taking a break from EGMs from time to time.

The results of some studies (Gallagher et al. 2004; Stewart and Wohl 2013; Jardin and Wolfert 2009; and a review by Monaghan 2010) suggest that warnings are likely to reduce time spent gambling and/or expenditure. One study suggested that there was modest (4.2 percent) self-reported intention to change actual gambling behaviour associated with exposure to such messages, when trialled in a venue setting. This study was also not designed to enable collection of user data to verify any such changes in gambler behaviour (Blaszczynski et al. 2013). Our conclusion is that there is a modest evidence base for the harm minimisation effectiveness of these practices.

However, there were a number of limitations to most of these studies. Almost all assessments of the actual effectiveness of messages were laboratory based, and a number used university or college students (Steenbergh et al. 2004; Monaghan and Blaszczynski 2010; Floyd et al. 2006; Stewart and Wohl 2013; Jardin and Wulfert 2009).² Further, the experimental nature of many studies arguably reduces the generalisability of these findings to 'real world' gambling environments.

Other limitations we identified included small sample sizes (Jardin and Wulfert; 2009; Ladouceur and Sevigny 2003), some self-report bias (Gallagher et al. 2004; Monaghan and Blaszczynski 2010), a lack of control group or baseline data (Monaghan and Blaszczynski 2010; Cloutier et al. 2006), and a lack of problem gamblers in study samples (Cloutier et al. 2006; Steenbergh et al. 2004; Ladouceur and Sevigny 2003; Benshain et al. 2004).

Identification of problem gambler characteristics and interaction with gamblers

We identified one paper assessing the relationship between problem gambling status and observable indicators. Four papers reviewed expert opinion on this subject, and one study used a construct of ethical conduct as proxy for identification of problem gamblers. Our general conclusion is that there is little evidence for the harm minimisation effectiveness of practices where venue staff identify problem gambling behaviour and then interact with gamblers so identified.

² For discussion of the reliability of such studies see Gainsbury et al. (2014).

Further, the literature suggests that there is little expert or other consensus on the likelihood of staff identifying and acting to intervene in problematic gambling situations. That is, even in circumstances where it is feasible for staff to identify people exhibiting indications of problem gambling, venue-staff may be reluctant to intervene. Despite this, there has been some focus on research to support venue workers to identify problem gamblers (Thomas et al. 2014; Delfabbro et al. 2007). Modification of codes of practice may also lead to improved rates of intervention.

Pre-commitment

Pre-commitment is known in some jurisdictions as an ‘electronic responsible gambling device’, as these systems can incorporate a range of features to support gamblers to limit their gambling losses. While some Australian operators have provided optional non-binding pre-commitment systems – a regulatory requirement of their loyalty programs – binding systems with a wider reach have now been adopted in several international jurisdictions, including Sweden (Centre for the Advancement of Best Practices 2009; Svenska Spel 2013); Norway (Hoffmann 2012); and Nova Scotia, Canada (Bernhard et al. 2006; Omnifacts Bristol Research 2007; Schellinck and Schrans 2007, 2010)

Evaluation of whether ‘pre-commitment’ is effective in reducing gambling-related harm must be considered in the context of:

- whether the system is universal; pre-commitment must be used by all gamblers on all machines across a wide geographic area;
- whether limit setting is required; and
- the extent to which limits are binding and revocable (Williams 2010).

The type of system implemented is a major factor in its likely effectiveness. However, there appears to be a tendency to conflate the differing systems of pre-commitment, generating a lack of clarity in the evidence base. The variety of systems described in this section demonstrates that all pre-commitment systems are not alike. While the evidence base is somewhat limited in demonstrating the effectiveness of universal and binding pre-commitment systems, it does demonstrate that partial – or optional – systems are *not* effective population-wide harm reduction strategies. This is partly due to the limited uptake of these systems, but also because gambling can readily occur outside the system in optional systems, undermining the binding nature of an idealised pre-commitment system.

Evidence from various implementations of pre-commitment have demonstrated that voluntary or ‘opt-in’ pre-commitment systems are of only very limited effectiveness, as uptake of these systems is typically very low. For example, reports from the voluntary evaluation in Nova Scotia demonstrate only around 1-2 percent of gamblers use this system (Williams 2013).

Our general conclusion is that there is a developing but still modest evidence base for the effectiveness of pre-commitment systems. Further, the strength of this evidence has been diluted by lack of terminological clarity in the form of system adopted, and consideration of associated limitations and strengths in the pursuit of harm minimisation.

Primary purpose: limits on losses and time

Gamblers often substantially underestimate the amount of money that they spend gambling (Blaszczynski et al. 2008). A key aspect of a pre-commitment system is the capacity for gamblers to set monetary loss limits. Time limits can also be configured in pre-commitment systems, however some studies find these are less often used (Ladouceur et al. 2012; Office of Regulatory Policy 2009). But time limits may be useful; an evaluation in Nova Scotia found that time limits reduced negative outcomes for at-risk and problem gamblers, with average PGSI score reduction of approximately 3.7 points (Polatschek et al. 2013). Time limits may also be used as a way to electronically self-exclude from gambling for a set period of time or time of day.

Complementary features: account summary, self-exclusion, tailored messages

In a pre-commitment system, gambling activity can be tracked to an individual gambler to provide information, assuming all gambling is made using the same individual account. This account summary information may support safer levels of gambling by detailing how much has been spent over a session, week, month, and year. This may reveal the extent of gambling and inform behavior change. Account summaries are among the most popular features; 88 percent of respondents in a Canadian study reported they would like access to this information (Centre for the Advancement of Best Practices 2009). However, an unintended consequence for a small sub-group of problem gamblers in one evaluation was that they may have been encouraged by this information to 'chase their losses' (Bernhard et al. 2006; Schellinck and Schrans 2007). This concern stems from a system that does not require limits to be set.

Other features that may be enabled through pre-commitment systems include tailored or 'smart' messages that pop up on the EGM screen and remind users how much time or money has been spent, essentially becoming a dynamic version of in-venue signage. It may also be possible to provide electronic self-exclusion options, and these may be tailored for specific periods, such as selected days or times of the day, unlike paper-based self-exclusion which is designed to bar a gambler from not only a machine but usually an entire venue for a set period of time (such as a year). Effectively, in addition to the capacity to restrict losses to a limit the gambler determines is appropriate, pre-commitment can enable the consolidation of a range of strategies that may support safer EGM use.

Importance of system architecture

In Nova Scotia, less than 1 percent of gamblers used the 'voluntary' pre-commitment system (Polatschek et al. 2013). An Australian evaluation found one of the largest barriers to uptake of a 'voluntary' system was that consumers did not see pre-commitment as relevant to them, as they did not have a gambling problem (Delfabbro 2012). Furthermore in Nova Scotia, where a voluntary system was in place for two years prior to the establishment of the universal system, consumers reported resistance to the mandatory system because they believed they could manage their own gambling without this (Polatschek et al. 2013). In voluntary systems, gamblers who use pre-commitment cards may be stigmatised, as they can be seen as a tool only for gamblers who have trouble controlling their expenditure. This contrasts with normalised pre-commitment cards functioning as part of a system that reduces and prevents harm for all gamblers (Delfabbro 2012; Schellinck and Schrans 2010).

In the context of a public health approach, it is useful to recognise that population-wide measures are likely to be the most effective in preventing the development of harm (Rose et al. 2008). An opt-in system, on the other hand, can be likened to a targeted approach. As has been demonstrated for a range of health conditions, it is not possible to accurately predict who in the population will develop a particular disease, underlining the value of universal or population-wide approaches.

Systems around the world

In Australia a small number of venues or corporations have implemented pre-commitment systems. To date, all Australian systems have been partial, meaning that gamblers are not required to use this system, and limit setting is optional. They are also non-binding; when limits are reached generally only a reminder is activated, and gambling can continue. These systems have typically been developed as a component of cashless or card based gaming systems and/or loyalty programs, as optional 'responsible gambling' features (Delfabbro 2012; Nisbet 2005; Office of Regulatory Policy 2009; Schottler Consulting 2008, 2009, 2010b). Evaluations show that use of pre-commitment features is typically low; between 0.7–2.3 percent (Delfabbro 2012; Schottler Consulting 2009, 2010b).

Until the passage of the *Victorian Gambling Regulation Amendment (Pre-commitment) Bill 2013* there had been no legislative requirement to provide pre-commitment to gamblers across a wide geographic area (i.e. across a state). This legislation will require pre-commitment systems to be provided on all EGMs from December 2015. The Commonwealth *Gambling Measures Act 2012* proposes to develop a timeframe to work with States and Territories to develop venue-based voluntary pre-commitment.

At the other end of the spectrum, the pre-commitment system in Norway is universal, requiring all gamblers to register. Furthermore, the government regulates maximum daily (up to around AU\$150) and monthly (up to around AU\$700) loss limits. Analysis found that 15 percent of Norwegian multix (as the system is known) gamblers were prevented from gambling beyond the monthly mandated limit (Hoffmann 2012).

While no published evidence is yet available, Sweden has reportedly moved from a voluntary hybrid system, where pre-commitment was only required for higher intensity machines, to a system where it is now required on all machines (Svenska Spel 2013). An evaluation of this system is underway.

In Nova Scotia, Canada, a card must be used to activate pre-commitment on all machines. The system is segmented into 'full' or 'light' enrollment options; in light enrollment the gambler does not need to provide identification, and past transaction history information is not available. Under full enrollment the gambler registers using identification, which then allows them to access past transaction history information using their card. This has led to a system where gamblers can use multiple cards, undermining the potential effectiveness of the system (Polatschek et al. 2013). Despite this, there has been a drop in video lottery terminal (VLT) use and also a decline in revenue, with reports that some casual gamblers no longer gamble. This indicates some positive population-wide impacts of the system. It was recently reported that this system will be discontinued because of a perceived lack of cost-effectiveness (CBC News 2014).

Unintended consequences

Some researchers have cast doubt has been cast on the likely effectiveness of pre-commitment. They express concern about the potential unintended consequences of problem gamblers setting excessively high limits. However, this concern appears to rely upon a misinterpretation of the evidence. One key review identifying this as an issue (Ladouceur et al. 2012) makes reference to a study of gamblers' adherence to limits (Schottler Consulting 2010a). This latter study reported that gamblers were more likely to set higher limits prior to gambling when they were at the venue, compared to after a gambling session at a venue (p. 39). While this study shows that problem gamblers set higher limits than no-risk, low-risk, and moderate-risk gamblers, this would be expected given the nature of the gambling behavior across gambler categories. Our interpretation of this study is that it highlights the relevance of the location in which a limit is set (that is, away from the venue environment with visual and auditory cues to spend), but does not provide evidence of problem gamblers setting excessively high limits in a pre-commitment system generally.

While problem gamblers might well set initially high limits, a good system of pre-commitment allows any gambler to lower their limit at any time for a significant binding period, but not to raise it. In that case, initial settings (or their location) are not necessarily that relevant. The issue is the capacity to set subsequent lower binding limits. Regardless, in the absence of a universal pre-commitment system, the problem gambler segment is currently unsupported in limiting losses.

Further doubt has been cast on pre-commitment as a harm reduction measure by researchers suggesting that manufacturers of gambling software have a vested interest in the wider uptake of these systems. These authors suggest that marketing this software without an evidence base to support its effectiveness may be irresponsible (Nower and Blaszczynski 2010). This issue was highlighted in the recent decision to dismantle the Nova Scotia pre-commitment system (CBC News 2014).

Tangential focus of research questions

A significant proportion of the pre-commitment research has focused on attitudes of gamblers towards the system and their intentions and motivations to use these systems, for example, the 1997/98 Nova Scotia video lottery players' survey, (McDonnell-Phillips 2006). Presumably the aim of these questions is to gauge the likelihood of gambler uptake and acceptance in optional or 'voluntary' systems. While consumer acceptance is a critical factor, our assessment is that these questions are secondary to the evaluation of technical features that may encourage safer spending levels. If the system is well designed, and its use is required, this may lead to greater consumer acceptance. Studies assessing consumer attitudes and opinions about pre-commitment were included in the first major review of pre-commitment in gambling, and as a consequence a large part of the review is consumed by factors that do not evaluate the efficacy of the system as a 'responsible gambling strategy', as the authors describe (Ladouceur et al. 2012). Because there are important differences between opt-in systems – and those with optional limit-setting features – and universal systems, it is important to clarify the nature of the system to which gamblers are exposed in a research environment. It is probable that exposure to different systems will produce different outcomes in consumer attitudes.

A recent review of the evidence for pre-commitment as a 'responsible gambling strategy' (Ladouceur et al. 2012) concluded that because of limited evidence, 'further systematic trials should be implemented to determine the impact of pre-commitment

systems on gamblers' behavior' (p. 215). On balance, it would appear that while the evidence base is still developing, potential harms from the unintended consequences of a pre-commitment system could be mitigated through system modification. In the meantime, the cost of inaction on the rollout of a universal pre-commitment system is likely to be greater than the cost of any unintended consequences associated with this action (Banks 2011).

Removal of ATMs

We identified one paper assessing the effects of the removal of ATMs from gambling venues. This followed the decision of the Victorian government to implement this measure in 2012. In line with the findings of this paper, we believe that there is modest but reasonable evidence to support ATM removal as a harm minimisation measure.

Thomas et al. (2013) concluded that the measure leads to a decline in gambling revenue of around 7 percent in nominal terms. We calculate the decline in real terms as 9.3 percent (VCGLR 2014, ABS 2014). Thomas et al. (2013) also report that ATM removal reduced expenditure in particular by problem gamblers.

The study involved in-venue observation and interviews with key informants including gamblers, venue managers and others. While acknowledging that other major structural changes had occurred in the Victorian EGM sector at about the same time as the ATM removal, the study did not take account of the potential confounding effect of these changes. These structural changes involved the transfer of EGM ownership and operating rights from a statewide duopoly to individual venues, and significant reform of EGM taxation measures, whereby the revenue share of venues was significantly increased.

Earlier studies (McMillen et al. 2004; McMillen and Pitt 2005; McMillen and Wright 2008) concluded that restricting access to cash through the removal of ATMs had some potential to reduce the expenditure of problem gamblers, although these studies were limited by their methods (largely involving self-report). Overall, the evidence base for this measure is modest, focuses on the effectiveness of the measure, and derives from a 'natural experiment' within a single jurisdiction using data of good quality.

Responsible Gambling overall

We identified seven papers addressing some aspect of responsible gambling practices in general terms. Another two papers canvassed the perceived impacts of responsible gambling practices amongst gamblers.

Our general conclusion is that there is limited evidence of the harm minimisation effects of responsible gambling practices on gambler behavior. In fact, as a prominent Australian researcher (Hing 2004) in this field has written:

The quantitative results indicate that the clubs' responsible gambling practices have had little effect on the way the vast majority of respondents think about their gambling, feel about their gambling, how often they gamble, how long they gamble for and how much they spend ... responsible gambling practices cannot be considered as being very effective for most problem gamblers or for most of those who are at risk.

One (non-peer reviewed) study suggested positive benefits for gamblers from provision of a counselling session (Sani, Carlevaro and Ladouceur 2005). The remaining studies focus on the perceived impacts of responsible gambling training or policies on staff or management practices and do not canvass the effect or impact of these on gambler activities, expenditure or behavior. Accordingly, no data have been generated to demonstrate that responsible gambling practices in general are effective to any significant degree.

Reduction of maximum bets

The Productivity Commission recommended that maximum bets on EGMs in clubs and hotels be reduced to one dollar per spin or wager, a decline from \$10 in some Australasian jurisdictions. Some jurisdictions have reduced bets to \$5 or, in New Zealand, to \$2.50 per spin. No Australasian jurisdiction has yet introduced a one dollar maximum bet.

The evidence for this intervention is largely circumstantial, but the Productivity Commission's case for the measure was clear and logical. Overall, our conclusion is that there is a reasonable evidence base to suggest that reduction in maximum bets is likely to be an effective harm minimisation measure. However, the formal evidence for this is relatively limited.

Data from the UK Gambling Commission indicate that high denomination slot machines (particularly Fixed Odds Betting Terminals, or FOBTs) are associated with a very disproportionate share of total gambling revenue. In 2010-11, such devices (B2 category machines, with maximum bets up to £100 per wager) accounted for 64.7 percent of revenue (averaging £40,500 per machine p.a.), but a much smaller 23.7 percent of total machines. In contrast Type C and D machines, with maximum bets of no more than £1, accounted for 65.5 percent of machines and 12 percent of revenue (averaging between £2,000 and £3,000 per machine p.a.) (UK Gambling Commission 2011). FOBTs have been the subject of significant reform efforts in the UK, given their very high bet limits and association with gambling problems (Campaign for Fairer Gambling 2014).

In 2001, the NSW gambling operators group commissioned a study to test the effectiveness of a range of harm minimisation measures put forward by the NSW gambling regulator (Blaszczynski et al. 2001). This study involved the use of specially modified EGMs. The authors tested modifications including bet reduction to one dollar, reduction in spin rate (the speed at which wagers may be placed), and the denomination of notes accepted by the EGMs. They concluded that the bet reduction measure appeared to be effective in reducing the time and money spent by problem gamblers, and did not inconvenience non-problem gamblers (Blaszczynski et al. 2001). Other measures were evaluated as ineffective.

The Productivity Commission noted that problem gamblers report betting more than 50 percent of the time at levels above one dollar, and that non-problem gamblers do so about 10 percent of the time (Productivity Commission 2010). Thus it appears probable that bet reduction would, as Blaszczynski et al. (2001) found, be unlikely to disrupt the enjoyment of non-problem gamblers, while assisting problem gamblers to reduce their expenditure.

In 2010 the Parliament of Tasmania conducted an investigation into the likely impact of one dollar maximum EGM bets on revenue for gambling operators and the Tasmanian government tax base (House of Assembly Select Committee 2010). Data

obtained from the gambling industry for the purposes of this inquiry revealed that 82-85 percent of gamblers bet at or below one dollar per spin, with an average of 64 cents, and that most gamblers selected a minimum bet with maximum lines as found in previous studies (Dixon et al. 2010; Livingstone et al. 2008; Productivity Commission 2010). Around 37 percent of revenue was derived from bets above one dollar per spin. The decline in revenue in Tasmania should a one dollar maximum bet be introduced was estimated at 20 percent, noting that not all the revenue derived from those betting at more than one dollar per spin would, in fact, be lost (House of Assembly Select Committee 2010).

In Victoria, a reduction in bet sizes in 2009-10 from a maximum of \$10 to \$5 per wager was associated with a reduction in real EGM expenditure of 5.7 percent between 2008-09 and 2009-10 (VCGLR 2014; ABS 2014). However, no evaluation of this measure was published, so it is unclear whether this was an effect, wholly or partially, of the reduction of the maximum bet. It represents the third largest annual reduction in EGM expenditure in Victoria after those occurring following the introduction of smoking bans (11.7 in 2009-10) and the removal of ATMs (9.3 in 2009-10).

Discussion

On the basis of the material reviewed, there remains for the most part only modest evidence supporting the harm minimisation (or indeed other effects) of major elements of extant 'responsible gambling' practices commonly deployed within gambling venues in Australasia.

Many studies in this area, and particularly some older studies, are poorly designed and have severe limitations. In some cases this reflects the relative nascence of the field of gambling studies compared with analogous areas such as tobacco or alcohol. However, it may also reflect the complexity of conducting gambling research where researchers have been dependent upon government or industry funding or assistance to obtain access to gamblers (Cassidy et al. 2013; Livingstone and Woolley 2007). In particular we are concerned by the lack of studies attempting to assess the harm minimisation effectiveness of many such interventions. In many cases, studies are at best process evaluations. Although such studies can provide useful information about recall by gamblers, or the relative efficiency of implementation of interventions, they cannot by their nature assess the harm minimisation effectiveness of interventions.

Arguably the evidence base for many actually existing responsible gambling practices is less robust than that for other measures such as pre-commitment (as we note above), the removal of ATMs from gambling venues, or the reduction of maximum bet limits. It is notable that these latter interventions have been disputed by industry on the basis of a 'lack of evidence' (Clubs Australia 2012).

Interestingly, the example of Victoria provides some insights into the cumulative effects of incremental introduction of EGM harm minimisation features, broadly defined. In Australia generally there does appear to have been a decline in the prevalence of problem gambling (Productivity Commission 2010), and in the case of Victoria, real net gambling revenue has declined over a long period. This suggests that, collectively, incremental reforms have had significant impacts on real EGM gambling expenditure.³ Whether this signals a decline in rates of gambling harm is

³ However, it is important to note that reduced EGM spending may reflect other consumer spending trends, such as the novelty wearing off or new consumer products that divert people to other recreational pursuits, or to other

unclear, since available data (The Centre for Gambling Research and Australian National University 2004; Department of Justice 2009) suggest that the rate of gambling problems among those actually using EGMs may have stayed constant. However, it is likely that revenue reductions signal a decline in harmful gambling to some extent.

It is notable that the largest impacts on real EGM revenue in Victoria occurred at the same time as the introduction of the first wave of smoking prohibitions between 2001-02 and 2002-03 (a real decline in revenue of 11.7 in 2009-10 in real terms), and the removal of ATMs from venues in 2012-13 (a real decline in revenue of 9.3 in 2009-10). A smaller revenue decline occurred at the time of the reduction of maximum bets from \$10 to \$5 (a real decline in revenue of 5.7 between 2008-09 and 2009-10).⁴ Overall, the decline in accessibility associated with a global limitation on EGM numbers coupled with a growing population may also have reduced revenue. Further, between 2003 and 2008 in Victoria, EGM gambling participation declined from 33.5 percent of the adult population to 21.5 percent (Department of Justice 2009; The Centre for Gambling Research and Australian National University 2004).

Conclusions

Existing and widely observed responsible gambling practices, particularly those ‘in-venue’, appear to have at best a modest evidence base demonstrating their efficacy. This is not to say that such practices are necessarily ineffective. The absence of evidence around a particular practice does not mean that it has no beneficial effects. Further, the absence of well-designed and rigorous studies in many areas we have examined means that the most effective or critical design aspects of some interventions are not known. This is clear in the case of pre-commitment and self-exclusion, where the details of implementation and design are critical to the effectiveness of the intervention. Thus the effectiveness of other interventions, for which evidence is currently sparse or lacking, might be considerably improved by identification and implementation of such critical features. In the absence of good quality studies, identification of critical improvements becomes very difficult. The federal system of gambling regulation in Australia provides scope for more rigorous studies based on the natural experiments that such jurisdictional variation allows.

The Victorian data cited above suggest that although in-venue interventions may be lacking an evidence base, there is some evidence to suggest that, collectively, a range of harm minimisation measures may have produced positive effects. The value of multiple measures working concurrently in reducing harm is a point well made by others (Williams 2013).

The most effective interventions, measured by apparent effects on aggregate EGM expenditure, and on the quality of available evidence, appear to be those where a relatively significant feature of the EGM or its environment was modified. On this basis, interventions such as those recommended by the Productivity Commission (for example, reduction of maximum bets or effective technical pre-commitment), or those addressing EGM game characteristics, may be expected to yield significantly more effective harm minimisation effects than in-venue practices such as signage or, indeed, self-exclusion. These benefits will have to be balanced, however, against any costs in terms of loss of enjoyment to non-problem gamblers, if any, that might arise

changes not relating directly to gambling reforms, such as smoking bans, to be discussed below.

⁴ We performed these calculations using data from VCGLR (2014) and ABS (2014).

from harm-minimisation measures aimed at problem gamblers, an issue that some studies identified have addressed (Productivity Commission 2010, Blaszczynski et al 2005). As the Productivity Commission argued, however, the dividend from effective harm minimization is likely to be significant. Taking no policy action on the basis of uncertainty ignores that fact. Nevertheless, well-designed and independent trials and *ex post* evaluation of any potentially costly new measures may be the desirable precursors to their full-scale deployment. It will also be helpful to policy-makers to develop a clear and independently assessed understanding of the likely actual costs and benefits of such measures.

It is also clear that significant work remains to be done to identify harm minimisation measures that are effective in achieving their aim, which – despite the lack of specificity associated with responsible gambling generally – we assume to be the significant reduction or eradication of gambling related harm.

This includes improvement in the study questions, study design and data collection methods used in evaluations of interventions, and other studies exploring the effectiveness of interventions. We also recommend the introduction of rigorous – and mandatory – evaluation and assessment of harm minimisation measures, including those currently operating. Many such interventions appear never to have been subjected to such evaluation, and the evidence base reflects this.

Acknowledgments

The authors acknowledge the assistance of two anonymous referees for their valuable and helpful comments on earlier drafts of this article.

References

Australian Bureau of Statistics, 2014. Cat no. 6401.0 *Consumer Price Index Australia*, Tables 1 and 2, ABS, Canberra.

Ariyabuddhiphongs, V 2013. Problem gambling prevention: before, during, and after measures. *International Journal of Mental Health and Addiction*, 11(5): 568–582.

Banks, G 2011. *Evidence and Social Policy: The Case of Gambling*. Paper presented at the South Australian Centre for Economic Studies, Corporate Seminar, Adelaide.

Bernhard, BJ, Lucas, AF, and Jang, D 2006. *Responsible Gaming Device Research Report*, University of Nevada, Las Vegas.

Blaszczynski, A 2001. *Harm Minimization Strategies in Gambling: An Overview of International Initiatives and Interventions*. Australia Gaming Council, Canberra.

Blaszczynski, A, Ladouceur, R, Goulet, A, and Savard, C 2008. Differences in monthly versus daily evaluations of money spent on gambling and calculation strategies. *Journal of Gambling Issues*, 21: 98–105.

Blaszczynski, A, Ladouceur, R, and Nower, L 2007. Self-exclusion: A proposed gateway to treatment model. *International Gambling Studies*, 7(1): 59–71.

Blaszczynski, A, Sharpe, L, and Walker, M 2001. *The assessment of the impact of the reconfiguration on electronic gaming machines as harm minimisation strategies for problem gambling Final Report*. University of Sydney Gambling Research Unit.

CBC News 2014. VLT cards that track gambling habits abandoned in Nova Scotia, <www.cbc.ca/news/canada/nova-scotia/vlt-cards-that-track-gambling-habits-abandon

ed-in-nova-scotia-1.2741683>, viewed 4 September 2014.

Cassidy, R., Loussouarn, C, and Pisac, A 2013. *Fair Game: Producing Gambling Research*, Goldsmiths University, London.

Centre for the Advancement of Best Practices 2009. *Insight 2009: Play Information and Management System*, Responsible Gambling Council, Ontario.

Clubs Australia Incorporated 2012. *Part of the Solution: Clubs Promoting a Culture of Responsible Gambling*. Clubs Australia Incorporated, Sydney.

Cohen, IM, McCormick, AV, and Corrado, RR 2011. *BCLC Voluntary Self-Exclusion Program*.

Croucher, R, and Croucher, J 2005. Self-exclusion programs for problem gamblers in Australia. *Journal of the Academy of Business and Economics*, 5, 61–66.

Delfabbro, P 2012. *Evaluation of the Maxetag Budget Setting Feature: Final report*. Adelaide, School of Psychology, University of Adelaide.

Delfabbro, P, Borgas, M, and King, D 2012. Venue Staff Knowledge of Their Patrons' Gambling and Problem Gambling. *Journal of Gambling Studies*, 28(2): 155–169.

Department of Justice 2009. *A Study of Gambling in Victoria: Problem Gambling from a Public Health Perspective*. Victorian Government, Department of Justice, Melbourne.

Department of Justice and Attorney-General 2013. *Queensland Responsible Gambling Resource Manual*, Section D, Version 3, <publications.qld.gov.au/storage/f/2014-06-25T02%3A00%3A15.582Z/queensland-responsible-gambling-resource-manual-tab.pdf>.

Dixon, MJ, Harrigan, KA, Sandhu, R, Collins, K, and Fugelsang, JA 2010. Losses disguised as wins in modern multi-line video slot machines. *Addiction*, 105(10), 1819–1824. doi: 10.1111/j.1360-0443.2010.03050.x

Centre for Gambling Research and Australian National University 2004. *2003 Victorian Longitudinal Community Attitudes Survey*. Gambling Research Panel, Melbourne.

Gainsbury, S 2010. *Self-exclusion: A Comprehensive Review of the Evidence*, Ontario Problem Gambling Research Centre, Guelph.

Gainsbury, S 2014. Review of self-exclusion from gambling venues as an intervention for problem gambling. *Journal of Gambling Studies*, 30(2): 229–251.

Gainsbury, S, Russell, A and Blaszczynski, A 2014. Are Psychology University Student Gamblers Representative of Non-university Students and General Gamblers? A Comparative Analysis, *Journal of Gambling Studies*, 30(10): 11–25.

Government Statistician, and Queensland Treasury and Trade 2014. *Australian Gambling Statistics 1986-87 to 2011-12*, 29th edition, Queensland Treasury and Trade, Brisbane.

Hayer, T, and Meyer, G 2011. Self-exclusion as a harm minimization strategy: evidence for the casino sector from selected European countries, *Journal of Gambling Studies*, 27(4): 685–700.

Hing, N 2004. The efficacy of responsible gambling measures in NSW clubs: The gamblers' perspective. *Gambling Australia*, 16(1): 32–46.

Hoffmann, BH 2012. Responsible gaming and IVTs (Interactive Video Terminals): The Norwegian story – With a happy ending? Norsk Tipping AS – Norwegian National Lottery, April, <www.responsiblegambling.org/docs/discovery-2012/the-norwegian-story---with-a-happy-ending-.pdf?sfvrsn=12>, viewed 16 September 2014.

House of Assembly Select Committee 2010. *The Gaming Control Amendment Bill 2010 (\$1 bet limit)*. Hobart, Tasmania

Ladouceur, R, Blaszczynski, A, and Lalande, DR 2012. Pre-commitment in gambling: A review of the empirical evidence, *International Gambling Studies*, 12(2): 215–230.

Ladouceur, R, Bouchard, C, Rheume, N, Jacques, C, Ferland, F, Leblond, J, and Walker, M 2000a. Is the SOGS an accurate measure of pathological gambling among children, adolescents and adults? *Journal of Gambling Studies*, 16(1): 1–24.

Ladouceur, R, Jacques, C, Giroux, I, Ferland, F, and Leblond, J 2000b. Brief communications analysis of a casino's self-exclusion program, *Journal of Gambling Studies*, 16(4): 453–460.

Ladouceur, R, Sylvain, C, and Gosselin, P 2007. Self-exclusion program: A longitudinal evaluation study, *Journal of Gambling Studies*, 23(1): 85–94.

Livingstone, C, and Woolley, R 2007. Risky business: A few provocations on the regulation of electronic gaming machines. *International Gambling Studies*, 7(3): 361–376.

Livingstone, C, Woolley, R, Zazryn, T, Bakacs, L, and Sharmi, R 2008. *The Relevance and Role of Gaming Machine Games and Game Features on the Play of Problem Gamblers*, Independent Gambling Authority of South Australia, Adelaide.

Markham, F, Young, M, and Doran, B 2014. Gambling expenditure predicts harm: evidence from a venue-level study. *Addiction*, 109(9): 1509–16.

McAllister, I 2014. Public opinion towards gambling and gambling regulation in Australia, *International Gambling Studies*, 14(1): 146–160.

McDonnell-Phillips 2006. *Analysis of Gambler Pre-commitment Behaviour*, Gambling Research Australia.

McMillen, J, and Pitt, S 2005. *Review of the ACT Government's Harm Minimisation Measures*. Centre for Gambling Research, Australian National University, Canberra.

McMillen, J, and Wright, J 2008. Re-regulating the gambling industry: Regulatory reform in Victoria and New South Wales, 1999–2006, *Australian Journal of Political Science*, 43(2): 277–300.

McMillen, J, Marshall, D, and Murphy, L 2004. *The use of ATMs in ACT Gaming Venues: An Empirical Study*, Centre for Gambling Research, Australian National University, Canberra.

Nelson, SE, Kleschinsky, JH, LaBrie, RA, Kaplan, S, and Shaffer, H. 2010. One decade of self-exclusion: Missouri Casino self-excluders four to ten years after enrollment, *Journal of Gambling Studies*, 26(1): 129–144.

Department of Internal Affairs 2006. *Operational Policy – Internal Guidelines Harm Prevention, Harm Minimisation and Responsible Gambling*.

Department of Internal Affairs 2014. *Gambling Expenditure Statistics*, <www.dia.govt.nz/diawebsite.nsf/wpg_URL/Resource-material-Information-We-Provide-Gambling-Expenditure-Statistics>, viewed 28 July 2014.

Fisher, D 2014. Facial recognition technology to nab casino's banned gamblers, *New Zealand Herald*, <www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=10892751>, viewed 16 September 2014.

Nisbet, S 2005. Responsible gambling features of card-based technologies, *International Journal of Mental Health and Addiction*, 3(2): 54–63.

Nisbet, S 2006. Modelling consumer intention to use gambling technologies: An innovative approach, *Behaviour and Information Technology*, 25(3): 221–231.

Nower, L, and Blaszczynski, A 2010. Gambling motivations, money-limiting strategies, and precommitment preferences of problem versus non-problem gamblers. *Journal of Gambling Studies*, 26(3): 361–372.

O'Neil, M, Whetton, S, Dolman, B, Herbert, M, Giannopoulos, V, O'Neil, D, and Wordley, J 2003. *Evaluation of Self-exclusion Programs and Harm Minimisation Measures: Report A*. South Australian Centre for Economic Studies, Adelaide.

Office of Liquor Gaming and Racing 2012. *Queensland Responsible Gambling Code of Practice*, <publications.qld.gov.au/storage/f/2014-06-25T01%3A44%3A14.314Z/queensland-responsible-gambling-code-of-practice.pdf>, viewed 16 September 2014.

Office of Regulatory Policy 2009. *Report: Queensland Card-based Gaming Trials*, Department of Employment, Economic Development and Innovation, Brisbane.

Omnifacts Bristol Research 2007. *Nova Scotia Player Card Research Project: Stage III Research Report*, Nova Scotia Gaming Corporation.

Panichi, J 2013. *The Lobby Group that got much more Bang for its Buck*, <inside.org.au/the-lobby-group-that-got-much-more-bang-for-its-buck>, viewed 5 April 2014.

Parke, J, Rigbye, J, and Parke, A 2008. *Cashless and Card-based Technologies in Gambling: A Review of the Literature*, UK Gambling Commission, Birmingham.

Polatschek, A, Wadden, L, and Gwynn, M 2013. *My-Play: Nova Scotia's Experience with a Responsible Gambling System for VLTs*, paper presented at the National Association of Gambling Studies, Sydney.

Productivity Commission 2010. *Gambling*. Report no. 50, Australian Government, Canberra.

Rose, G, Khaw, K. T, and Marmot, M 2008. *Rose's Strategy of Preventive Medicine*, Oxford University Press, USA.

Sani, A, Carlevaro, T, and Ladouceur, R 2005. Impact of a counselling session on at-risk casino patrons: A pilot study. *Gambling Research: Journal of the National Association for Gambling Studies (Australia)*, 17(1): 47.

Schellinck, T, and Schrans, T 2007. *Final Report: Assessment of the Behavioural Impact of Responsible Gambling Device (RGD) Features: Analysis of Nova Scotia Player-card Data – The Windsor Trial*, Nova Scotia Gaming Corporation Responsible Gaming Research Device Project, Focal Research, Halifax.

Schellinck, T, and Schrans, T 2010. *Evaluating the Impact of the 'My-Play' System in Nova Scotia Phase 1: Regular VL Player Benchmark Survey*, Technical report, Focal Research, Halifax.

Schottler Consulting 2008. *Major Findings of a Trial of a Card-based Gaming Product at the Sandgate RSL: Card-based Trial Evaluation*.

Schottler Consulting 2009. *Major Findings of a Trial of a Card-based Gaming Product at the Redcliffe RSL*.

Schottler Consulting. 2010. *Major Findings and Implications: Player Tracking and Precommitment Trial – A Program and Outcome Evaluation of the PlaySmart Precommitment System*. South Australian Treasury, Adelaide.

Schottler Consulting 2010a. *Factors that Influence Gambler Adherence to Pre-commitment decision*. Gambling Research Australia, Melbourne.

Schottler Consulting 2010b. *Major findings and implications: Player tracking and Precommitment trial. A Program and Outcome Evaluation of the PlaySmart Precommitment System*. South Australian Treasury, Adelaide.

Schüll, ND 2012. *Addiction by Design: Machine Gambling in Las Vegas*, Princeton University Press, Princeton.

Steinberg, M, and Velardo, W 2002. *Preliminary Evaluation of a Casino Self-Exclusion Program*, paper presented at the Responsible Gambling Councils Discover Conference, Niagara Falls, Canada.

Svenska Spel 2013. *Svenska Spel Pre-commitment: Information Videos for Customers and Retailers*, Sweden.

Svenska Spel 2013. "From voluntary to necessary": Responsible Gaming System on VLTs, <www.snsus.org/media/766/strand-from_voluntary_to_necessary-responsible_gaming_system_on_vlts.pdf>, viewed 4 September 2014.

Thomas, A, Delfabbro, P, and Armstrong, A 2014. *Validation Study of In-venue Problem Gambling Indicators*, Gambling Research Australia, <www.gamblingresearch.org.au/resources/85c394ee-bfcd-48ea-a507-992555401eaa/validation_study_of_invenue_problem_gambler_indicatorsv2.pdf>, viewed 16 September 2014.

Thomas, A, Pfeifer, J, Moore, S, Meyer, D, Yap, L, and Armstrong, A 2013. *Evaluation of the Removal of ATMs from Gaming Venues in Victoria, Australia*, Office of Liquor, Gaming and Racing, Department of Justice, Melbourne.

Townshend, P 2007. Self-exclusion in a public health environment: An effective treatment option in New Zealand, *International Journal of Mental Health and Addiction*, 5, 390–395.

United Kingdom Gambling Commission 2011. *Industry Statistics: April 2008 to March 2011*, <www.gamblingcommission.gov.uk/pdf/Industry%20statistics%20-%20April%202008%20to%20March%202011.pdf>, viewed 4 September 2014.

Victorian Commission for Gambling and Liquor Regulation 2014. *List of Responsible Gambling Codes of Conduct*, <www.vcglr.vic.gov.au/home/laws+and+regulations/codes+of+conduct+and+standards/codes+of+conduct/list+of+responsible+gambling+codes+of+conduct>, viewed 4 September 2014.

Victorian Commission for Gambling and Liquor Regulation 2014. *Gambling Expenditure Data*, <www.vcglr.vic.gov.au/home/resources/data+and+research/data/>, viewed 4 September 2014.

Victorian Responsible Gambling Foundation 2014. *What is Responsible Gambling?*, <www.responsiblegambling.vic.gov.au/awareness-and-prevention/know-the-odds>, viewed 28 July 2014.

Wilkie, A 2011. Personal correspondence.

Williams, R 2010. *Pre-commitment as a Strategy for Minimizing Gambling-related Harm*, Alberta Gaming Research Institute, Edmonton.

Williams, R, West, B, and Simpson, R 2007. *Prevention of Problem Gambling: A Comprehensive Review of the Evidence*, Ontario Problem Gambling Research Centre, Guelph.

Williams, R, West, B, and Simpson, R 2012. *Prevention of Problem Gambling: A Comprehensive Review of the Evidence and Identified Best Practices*, Ontario Problem Gambling Research Centre and the Ontario Ministry of Health and Long Term Care.

Williams, R 2013. *Prevention of Problem Gambling: A Comprehensive Review of the Evidence and Identified Best Practices*, webinar presentation, <knowledgex.camh.net/researchers/areas/sami/webinars/archive/Pages/11122013.aspx>, viewed 4 September 2014.

Zheng, WY, Walker, M, and Blaszczynski, A 2010. Mahjong gambling in the Chinese-Australian community in Sydney: A prevalence study, *Journal of Gambling Studies*, 26(3): 441–454.

Appendix 1: Literature Review Strategy

Databases

- CinahlPlus
- Informit
- Ovid Medline
- Proquest health and medical complete
- PsychINFO
- Sage reference online
- PubMed

Specific Journals

- Addiction
- Gambling Research
- International Gambling Studies
- Gambling Research
- International Journal Of Mental Health & Addiction
- Journal of Gambling Issues
- Journal of Gambling Studies
- Psychology of Addictive Behaviours
- The American Journal on Addictions

References

- Reference list of cited material in reviewed literature

Grey Literature and Websites

- Australian State Government websites (i.e., NSW Office of Liquor Gaming and Racing; Northern Territory Gambling Research
- Alberta Gaming and Liquor Commission
- Australasian Gaming Council
- British Gambling Commission
- Centre for Gambling Education and Research [Southern Cross University]
- Gambling Research Australia
- Independent Gambling Research Consortium
- National Gambling Board of SA
- National Gambling Board South Africa
- Ontario PG Research Centre
- Responsible Gambling Infohub
- University of Calgary Alberta Gambling Research Institute
- Parliamentary Library (Australia)

Keywords (including appropriate truncations)

- problem gambling
- harm minimisation
- harm reduction
- responsible gaming
- responsible gambling
- pokies

- poker machines
- EGMs
- video lottery terminals
- betting shops
- casinos

Specific Measures

- self-exclusion
- messages/pop up messages
- onscreen player information display (PID)
- advertising restrictions
- pre-commitment