

2012

# PREVENTION OF PROBLEM GAMBLING: A Comprehensive Review of the Evidence and Identified Best Practices

**Robert J. Williams**

Professor, Faculty of Health Sciences, and  
Coordinator, Alberta Gambling Research Institute  
University of Lethbridge, Lethbridge, Alberta, Canada

**Beverly L. West**

Research Associate, Faculty of Health Sciences  
University of Lethbridge, Lethbridge, Alberta, Canada

**Robert I. Simpson**

Past CEO, Ontario Problem Gambling Research Centre  
Guelph, Ontario, Canada

REPORT PREPARED FOR THE ONTARIO PROBLEM  
GAMBLING RESEARCH CENTRE AND THE ONTARIO  
MINISTRY OF HEALTH AND LONG TERM CARE

October 1 2012



## History of this document

Aug 2007	<p><i>Short version appears in a book chapter:</i></p> <p>Williams, R.J., West, B.L., &amp; Simpson, R.I. (2007a). Prevention of problem gambling. In G. Smith, D. Hodgins, and R.J. Williams (Eds.), <i>Research and Measurement Issues in Gambling Studies</i>. pp. 399-435. San Diego, CA: Elsevier. <a href="http://hdl.handle.net/10133/414">http://hdl.handle.net/10133/414</a></p>
Dec 2007	<p><i>Long version prepared as a report for the Ontario Problem Gambling Research Centre:</i></p> <p>Williams, R.J., West, B.L., &amp; Simpson, R.I. (2007b). <i>Prevention of Problem Gambling: A Comprehensive Review of the Evidence</i>. Report prepared for the Ontario Problem Gambling Research Centre. Guelph, Ontario, Canada. Dec 1, 2007. <a href="http://hdl.handle.net/10133/414">http://hdl.handle.net/10133/414</a></p>
Nov 2008	<p><i>Separate report prepared on Promising Practices in Prevention:</i></p> <p>Williams, R.J., &amp; Simpson, R.I. (2008). <i>Promising Practices in the Prevention of Problem Gambling</i>. Final Report prepared for the Ontario Problem Gambling Research Centre and the Ontario Ministry of Health and Long Term Care. November 14, 2008. <a href="http://hdl.handle.net/10133/751">http://hdl.handle.net/10133/751</a></p>
Dec 2008	<p><i>Minor literature update to the Dec 2007 report:</i></p> <p>Williams, R.J., West, B.L., &amp; Simpson, R.I. (2008). <i>Prevention of Problem/Pathological Gambling: A Comprehensive Review of the Evidence</i>. Report prepared for the Ontario Problem Gambling Research Centre. Guelph, Ontario, Canada. December 1, 2008. <a href="http://hdl.handle.net/10133/414">http://hdl.handle.net/10133/414</a></p>
Current document	<p>Substantive literature update and integration with the <i>Promising Practices in the Prevention of Problem Gambling</i> document.</p>

## Citation

Williams, R.J., West, B.L., & Simpson, R.I. (2012). *Prevention of Problem Gambling: A Comprehensive Review of the Evidence, and Identified Best Practices*. Report prepared for the Ontario Problem Gambling Research Centre and the Ontario Ministry of Health and Long Term Care. October 1, 2012. <http://hdl.handle.net/10133/3121>

## Acknowledgements

There are many external reviewers who have provided helpful feedback on the current and earlier versions of this document. However, in particular, the authors acknowledge the very useful feedback provided by Dr. Tim Stockwell (Director, Centre for Addictions Research of British Columbia, University of Victoria).

## Contact Information

Dr. Robert Williams  
 Professor, Faculty of Health Sciences &  
 Coordinator, Alberta Gambling Research Institute  
 University of Lethbridge  
 Lethbridge, Alberta, Canada; T1K 3M4  
[robert.williams@uleth.ca](mailto:robert.williams@uleth.ca)

INTRODUCTION.....	5
ETIOLOGICAL FRAMEWORK FOR PROBLEM GAMBLING.....	7
Indirect Biological Risk Factors.....	7
Indirect Environmental Risk Factors.....	9
Direct Risk Factors.....	9
Problem and Pathological Gambling.....	10
METHODOLOGICAL APPROACH.....	13
EDUCATIONAL INITIATIVES.....	15
Childhood Interventions .....	15
Information/Awareness Campaigns.....	15
Responsible Gambling Information Centres.....	20
Statistical Instruction.....	21
School-Based Prevention Programs.....	22
POLICY INITIATIVES.....	25
RESTRICTIONS ON THE GENERAL AVAILABILITY OF GAMBLING.....	25
Restricting the Number of Gambling Venues.....	26
Restricting More Harmful Types of Gambling.....	29
<i>Continuous Forms of Gambling</i> .....	29
<i>Internet Gambling</i> .....	35
Restricting the Number of Gambling Formats.....	37
Restricting Gambling to Dedicated Gambling Venues .....	37
Restricting the Location of Gambling Venues.....	40
Limiting Gambling Venue Hours of Operation.....	41
RESTRICTIONS ON WHO CAN GAMBLE.....	43
Prohibition of Youth Gambling.....	43
<i>Increasing the Legal Age for Gambling</i> .....	44
Restricting Venue Entry to Non-Residents.....	45
Restricting Venue Entry to Higher Socioeconomic Classes.....	46
Casino Self-Exclusion.....	46
RESTRICTIONS OR ALTERATIONS ON HOW GAMBLING IS PROVIDED.....	52
Modifying Electronic Gambling Machine (EGM) Parameters.....	52
<i>Win/Loss Patterns</i> .....	52
<i>Game Play Speed</i> .....	53
<i>Near Misses</i> .....	53
<i>Number of Play Lines</i> .....	54
<i>Bill Acceptors</i> .....	54

<i>Stake and Prize Size</i> .....	55
<i>Payback Percentage</i> .....	56
<i>Interactive Features</i> .....	57
<i>Pop-Up Messages</i> .....	58
<i>On-Screen Clocks</i> .....	59
<i>Mandatory Cash-Out</i> .....	59
<i>Privacy</i> .....	59
<i>Money versus Credits</i> .....	60
<i>Lights and Sounds</i> .....	60
<i>Seating</i> .....	60
<i>Summary of EGM Parameter Modifications</i> .....	61
Player Pre-Commitment.....	61
Eliminating Reward/Loyalty Cards or Changing Their Parameters.....	65
Operator Imposed Maximum Loss Limits.....	66
Proactive Intervention with ‘At-Risk’ Gamblers.....	67
<i>Problem Gambling Awareness Training to Employees</i> .....	67
<i>Automated or Mandated Intervention</i> .....	68
Restricting Access to Money.....	70
Restrictions on Concurrent use of Alcohol and Tobacco.....	72
Restricting Advertising.....	74
Gambling Venue Design .....	76
Increasing the Cost of Gambling.....	77
Government Provision of Gambling.....	78
 SUMMARY OF THE EFFECTIVENESS OF EDUCATIONAL AND POLICY INITIATIVES.....	 81
 BEST PRACTICES TO PREVENT PROBLEM GAMBLING.....	 84
1. Strive for Optimal Design and Evaluation of New Initiatives.....	84
2. Recognize that Effective Prevention requires Decreased Revenue and some Inconvenience to Non-Problem Gamblers.....	86
3. Employ a Wide Array of Educational and Policy Initiatives.....	87
4. Coordinate these Multiple Educational and Policy Initiatives.....	89
5. Decrease the General Availability of Gambling.....	90
6. Eliminate, Reduce, and/or Constrain Higher-Risk Forms of Gambling.....	92
7. Eliminate Reward Cards or use them to Foster Responsible Gambling.....	93
8. Restrict who is Eligible to Gamble.....	94
9. Restrict the use of Tobacco and Alcohol while Gambling.....	95
10. Restrict Access to Money while Gambling.....	96
11. Impart Knowledge, Attitudes, and Skills to Gamblers .....	97
12. Keep Prevention Initiatives in Place for a Sustained Period.....	99
 REFERENCES.....	 100

## INTRODUCTION

The past 30 years has seen a dramatic worldwide expansion of legalized gambling. The overall social and economic costs and benefits of this expansion are mixed (Williams, Rehm, & Stevens, 2011). However, what is clear is that one of the primary negative impacts of widely available gambling opportunities is the development of disordered gambling in a minority of people. Various terms have been used to describe disordered gambling, including ‘compulsive gambling’, ‘addictive gambling’, ‘problem gambling’, and ‘pathological gambling’. The term used in the present document is ‘**problem gambling**’. The definition of problem gambling put forward by Neal, Delfabbro, & O’Neil (2005) captures the essential elements common to almost all definitions: “*Problem Gambling is characterized by difficulties in limiting money and/or time spent on gambling which leads to adverse consequences for the gambler, others, or for the community.*” Essentially, a problem gambler is someone with a pattern of excessive gambling; impaired control over their gambling behaviour; significant negative consequences deriving from this impaired control; and persistence in excessive gambling despite these negative consequences. Problem gambling is assumed to have varying degrees of severity, ranging from mild, moderate to severe. The term ‘**pathological gambling**’ is synonymous with severe problem gambling.<sup>1</sup>

Depending on the year and the jurisdiction, the past year prevalence of problem gambling ranges from 0.5% to 7.6% of the adult population (Williams, Volberg, & Stevens, 2012). Problem gambling is associated with a range of negative consequences for the individual, his/her family, and for society in general. *Financial difficulties* tend to be the most common type of problem. A significant percentage of problem gamblers will eventually file for bankruptcy (Petry, 2005; Williams, Rehm, & Stevens, 2011). *Mental health problems* in the form of guilt, depression and anxiety are also common. Moreover, problem gamblers have a significantly elevated risk for suicide attempts and suicide (National Research Council, 1999; Williams, Rehm & Stevens, 2011) (Las Vegas has had the highest per capita rate of suicide in North America for many years). A small percentage of problem gamblers will develop stress-related *physical health problems* either in addition to or instead of mental health problems (i.e., high blood pressure, gastric disorders). Some problem gamblers experience *difficulties at work or school* because of their gambling. Poorer grades or reduced work productivity is not uncommon, and school failure or job loss sometimes occurs (National Research Council, 1999; Petry, 2005). *Criminal activity* to finance gambling (typically fraud or embezzlement) occurs in a minority of problem gamblers (National Research Council, 1999; Williams, Rehm & Stevens, 2011). Upward of 33% of prison inmates have histories of problem gambling (Williams, Royston, & Hagen, 2005). Problem gamblers typically have conflicts with family and/or friends over their gambling. These conflicts often lead to *relationship problems* (with spouse, children, and friends), sometimes lead to divorce, sometimes lead to domestic violence, and sometimes lead to child abuse and neglect. These problems, in

---

<sup>1</sup> ‘Pathological gambling’ is a less common term that is used mostly in the United States and among medical professionals (primarily due to the fact that ‘pathological gambling’ is the term used in the Diagnostic and Statistical Manual of Mental Disorders (DSM) produced by the American Psychiatric Association). ‘Problem gambling’ is the preferred term because it has fewer etiological connotations (i.e., ‘pathological’ means ‘disease-like’) and because pathological gambling in DSM is dichotomous, whereas evidence indicates that disordered gambling lies on a continuum. Most people now use the term ‘pathological gambling’ to denote ‘severe problem gambling’.

turn, may produce depression, anxiety, and poorer mental health in the spouse and children. There is also an inter-generational impact, as children who have a parent who is a problem gambler are at elevated risk for developing problem gambling themselves (Kalischuk et al., 2006; Shaw et al., 2007).

The past 15 years has seen a considerable amount of interest and effort being put into developing strategies to prevent problem gambling. Unfortunately, the development, implementation, and evaluation of most of these initiatives have been a haphazard process. Most have been put in place because they 'seemed like good ideas' and/or were being used in other jurisdictions, rather than having demonstrated scientific efficacy or being derived from a good understanding of effective practices in prevention.

The primary purpose of the present document is to help change this state of affairs. More specifically, by:

- Proposing an etiological framework for understanding how problem gambling develops based on the available evidence and drawing from established models of addictive behaviour.
- Comprehensively evaluating the effectiveness of the various initiatives that have been used around the world to prevent problem gambling based on their demonstrated efficacy and/or their similarity to initiatives that are empirically effective in preventing other addictive behaviour.
- Based on this etiological framework and this critical review of the research, identifying current 'best practices' for the prevention of problem gambling.

# ETIOLOGICAL FRAMEWORK FOR PROBLEM GAMBLING

In order to effectively prevent something, it is necessary to understand what causes it. The present section describes an etiological framework for understanding the causes of problem and pathological gambling based on the best available evidence. This framework is still somewhat tentative, as the exact etiology of problem gambling hinges on having longitudinal research that clearly identifies which variables are etiologically involved, their temporal sequence, and their causal connections. While several longitudinal studies of gambling exist (Slutske, 2007), all have limitations either because they do not include all the relevant variables, have small sample sizes and/or insufficient numbers of 'at risk' gamblers, too circumscribed an age range, short time spans, a limited number of collection periods, or poor retention rates. However, there are some major longitudinal studies of gambling with improved methodological design nearing completion in Canada, Sweden, and Australia that will provide much stronger empirical evidence about the etiology of problem gambling.

That being said, sufficient evidence is available to propose a tentative etiological framework based on the results of the longitudinal studies that do exist, the large amount of cross-sectional research that has identified correlates of problem gambling, twin studies, the retrospective reports of problem gamblers, and the etiological models that have been developed for addictive behaviour more generally (Griffiths, 2005a; Griffiths & Delfabbro, 2001; Kumpfer, Trunnell, & Whiteside, 1990; Marlatt et al., 1988; Shaffer et al., 2004; Sharpe, 2002; Wallace, 1993). Further to this latter point, the biopsychosocial approach is central to all etiological models of addiction, including the present framework. Essentially, this approach posits that there are a large number of biological, psychological, experiential, and social factors which interact in complex ways to both contribute to and protect individuals from developing addictive behaviour. In keeping with this biopsychosocial orientation, and incorporating the best current evidence about the likely etiology of problem gambling, the following is a description of the risk factors thought to contribute to problem gambling, and their plausible temporal sequence.

## Indirect Biological Risk Factors

Indirect risk factors are those that create vulnerabilities and tendencies which predispose people to gambling problems when later combined with more 'direct' factors.

Genetic inheritance creates biological propensities that increase or decrease a person's likelihood of engaging in gambling and/or developing problem gambling. Twin studies indicate that 40-50% of the propensity for developing or not developing problem gambling (heritability) can be predicted by genetic factors (Eisen et al., 1998; Lobo & Kennedy, 2006, 2009; Shah et al., 2005; Slutske et al., 2010). Although this figure may seem high to some people, it is very consistent with the heritability estimates of substance dependence, which ranges from 30% to 70% depending on

the substance (Agrawal & Lynskey, 2008; Goldman et al., 2005) as well as the heritability estimates of the major psychiatric disorders, which range from 30 – 85% (Shih et al., 2004).

Although there may be some gambling-specific genetic vulnerability, what people are often inheriting is a shared genetic vulnerability for several conditions, which explains the high degree of problem gambling comorbidity with a) substance use and abuse (Crockford & el-Guebaly, 1998; el-Guebaly et al., 2006; Petry, 2007; Petry, Stinson, & Grant, 2005; Vitaro et al., 2001; Zimmerman, Chelminski, & Young, 2006); b) delinquency and/or antisocial personality (Crockford & el-Guebaly, 1998; Petry, Stinson, & Grant, 2005; Vitaro et al., 2001); and c) mood disorders (Crockford & el-Guebaly, 1998; el-Guebaly et al., 2006; McCormick et al., 1984; Mood Disorders Society of Canada, 2004; Suck Won et al., 2006; Toneatto & Nguyen, 2007; Turner et al., 2008; Zimmerman, Chelminski, & Young, 2006) (see Black et al., 2006; Comings, 2006; Goodman, 2008; Goudriaan et al., 2004; Grant et al., 2006; Ibanez et al., 2002; Lobo et al., 2010; Potenza et al., 2005; Slutske et al., 2000; Slutske et al., 2010).

This genetic inheritance appears to express itself neurologically by means of differential functioning of the ventral striatum/mesolimbic pathway (“reward” pathway) (Buchel, 2006; Goodman, 2008; Goudriaan et al., 2004) as well as the ventromedial and dorsolateral regions of the prefrontal cortex (involved in executive functions and inhibition, among other things) (Chambers & Potenza, 2003; Dannon et al., 2011; Goudriaan et al., 2004; Grant, Brewer, & Potenza, 2006; van Holst et al., 2010).

One of the behavioural manifestations of this neurobiology is a *general decreased sensitivity to reward* (Grant, Brewer & Potenza, 2006; Oberg, Christie, & Tata, 2011; Reuter et al., 2005). This, in turn, likely explains the elevated concordance of attention deficit disorder (Breyer et al., 2009; Carlton et al., 1987) as well as increased propensity for risk taking and sensation seeking (Gibbs Van Brunschot, 2009; Parke, Griffiths, & Irwing, 2004; Powell et al., 1999; Toneatto & Nguyen, 2007). Another behavioural manifestation of this neurobiology is a *stronger preference for immediate over delayed rewards* (Chambers & Potenza, 2003; Goudriaan et al., 2004; Oberg, Christie & Tata, 2011; Parke, Griffiths, & Irwing, 2004; Petry & Madden, 2009; Shead et al., 2008; van Holst et al., 2010), which explains why problem gamblers are also often identified as having higher levels of impulsivity (Buchel, 2006; Chambers & Potenza, 2003; Goodman, 2008; Lawrence et al., 2009; Nower & Blaszczynski, 2006; Skitch & Hodgins, 2004; Steel & Blaszczynski, 1998; Toneatto & Nguyen, 2007; Turner, Jain, Spence, & Zangeneh, 2008; van Holst et al., 2010)

Having genetic, neurobiological and/or behavioural characteristics that are opposite to those listed above provides some protection from the development of problem gambling.



## Indirect Environmental Risk Factors

The above biological propensities are then shaped by environmental experience (primarily social) to either further increase or decrease risk.

Indirect environmental risk factors include: having an abusive or neglectful upbringing, parental involvement or modelling of gambling, peer group involvement in gambling, lower income, less education, societal acceptance of gambling, gambling opportunities being readily available, the presence of significant ongoing stressors and/or poor support systems, and gambling being commercially provided in an unsafe manner<sup>2</sup>. Having the opposite experiences or environmental attributes provides some protection from engaging in gambling in the first place and/or developing problem gambling (Alegria et al., 2009; Cunningham-Williams et al., 2005; Grant & Kim, 2002; Gupta & Derevensky, 1998; Kausch, Rugle, & Rowland, 2006; Langhinrichsen-Rohling et al., 2004; Lester, 1994; Loo, Raylu, & Oei, 2008; National Gambling Impact Study Commission, 1999; Petry, 2005; Petry & Steinberg, 2005; Productivity Commission, 1999, 2010; Raylu & Oei, 2004; Welte, Wieczorek, Barnes et al., 2004).

## Direct Risk Factors

Ongoing involvement in gambling is influenced by all of the above indirect risk factors as well as several more *direct risk factors* which have a more immediate influence on the likelihood of becoming a problem gambler. Many direct risk factors constitute the 'psychological' realm in the biopsychosocial model.<sup>3</sup> One of these concerns whether the person has ***erroneous cognitions or lack of knowledge*** about gambling. These erroneous cognitions ('gambling fallacies') include the failure to understand that most gambling outcomes are random and independent of past outcomes, that almost all forms of gambling have negative expected returns (i.e., the odds are biased against the gambler and it is not possible to make money over the long term), and that for most of these games there are no systems or behavioural strategies that can influence these random outcomes or the negative mathematical expectation (Chan & Ohtsuka, 2009; Fortune & Goodie, 2012; Gaboury & Ladouceur, 1989; Joukhador, Blaszczynski, & MacCallum, 2004; Joukhador, MacCallum, & Blaszczynski, 2003; Ladouceur, Sylvain, Boutin, et al., 2001; Ladouceur & Walker, 1996; Miller & Currie, 2008; Toneatto et al., 1997).

A second proximate risk factor concerns whether gambling ***serves a psychological need*** for the individual such as reliably providing temporary escape from other concerns or providing a very pleasurable (and needed) form of excitement. Alternatively, it may be that being identified as a 'gambler', and/or having money is a particularly important goal or measure of success to the

---

<sup>2</sup> The characteristics of this factor will be discussed in detail in the next section.

<sup>3</sup> Implicit in the present framework is the belief that a person's psychology is primarily derivative of one's biological endowment and life experience.

person (Blaszczynski & Nower, 2002; Nixon & Solowoniuk, 2009; Nixon, Solowoniuk, & McGowan, 2006; Volberg, Reitzes, & Boles, 1997).<sup>4</sup>

A third direct risk factor concerns the ***reward magnitude and frequency of the person's early gambles***. Having an 'early big win' appears to be an important determinant of gambling continuation (Turner, Zangeneh, & Littman-Sharp, 2006; Weatherly, Sauter, & King, 2004)<sup>5</sup>, as is engaging in 'continuous' forms of gambling that can provide a high frequency of reinforcement in a short period of time (i.e., electronic gambling machines, casino table games, 'continuous' lotteries; Dowling, Smith, & Thomas, 2005).

Once gambling is regularly engaged in, operant and classical conditioning begin to increase the frequency and strength of the behaviour and the physiological processes underlying it, making it progressively more difficult to wilfully resist (Petry, 2005; Skinner, 1953). At a psychological level, the person begins becoming ***preoccupied*** with thoughts of gambling and planning opportunities to gamble. At a behavioural level, the person starts engaging in ***risky gambling practices*** such as playing more often and longer than intended, spending above planned spending limits, and chasing losses. Preoccupation and risky gambling practices constitute the most direct risk factors for problem gambling.<sup>6</sup>

### Problem and Pathological Gambling

In light of the negative consequences that begin to occur for the gambler, the number and strength of the direct and indirect risk factors determines whether gambling continues or abates. Gamblers who have developed ***impaired control*** are persistently unable to stay within time and financial limits, often chase their losses, and find themselves unable to cut back or quit gambling. Impaired control is usually associated with a range of ***negative consequences***. As described in the Introduction, financial, psychological and social problems are the most common consequences, but health impairment, problems at school or work, and/or criminal/legal problems also sometimes occur. Significant ***negative consequences*** combined with ***impaired control*** constitute

---

<sup>4</sup> Some of these psychological needs may derive from an abusive or neglectful upbringing, poor coping skills, lack of social supports, presence of severe stressors, etc.

<sup>5</sup> People who report an 'early big win', also tend to report 'early big losses'. Thus, it may be that 'early big wins' are simply reflective of heavy involvement in gambling (which is the true risk factor).

<sup>6</sup> Combinations of these indirect and direct risk factors likely account for the association of problem gambling with other well-known variables. For example, the higher rate of gambling and problem gambling in young people (Williams, Volberg, & Stevens, 2012) is likely due to their greater propensity for risk-taking combined with their lack of knowledge and experience with gambling. The higher rate of gambling and problem gambling in males may be due to their higher rates of risk-taking and impulsivity in general (Cunningham-Williams et al., 2005). The higher rates of gambling and problem gambling found in people with Antisocial Personality (Blaszczynski & McConaghy, 1994; Meyer & Fabian, 1992; Slutske et al., 2001) is perhaps due to their higher rates of impulsivity, more materialistic orientation, and their adverse upbringing. The higher rate of gambling and problem gambling in people with Attention Deficit Disorder (ADD) is likely due to ADD's strong association with impulsivity and risk-taking.

**‘problem gambling’**, with severe forms of impaired control and negative consequences being known as **‘pathological gambling’**.

In many people, the same risk factors that lead to problem gambling independently lead to problems in other areas (i.e., other addictive behaviour, mental health problems, interpersonal problems, poor health practices, school/work problems, antisocial behaviour) (Petry, 2007; Petry, Stinson, & Grant, 2005; Rush, Bassani, Urbanoski, & Castel, 2008; Westphal & Johnson, 2007). Thus, most problem gamblers will also have associated comorbidities. Within this constellation of problems, each reinforces each other’s existence, hampering recovery from any. Even with recovery, most problem gamblers will have an ongoing propensity for re-engaging in the behaviour, and a significant portion will experience at least a few relapses in their lifetime.

Figure 1 illustrates the etiological framework described in the foregoing text. The particular pattern of risk factors that leads to problem gambling varies considerably between people, as does the age at which problem gambling develops. For example, in some people the combination of risk factors could be impulsivity + depression + parental gambling; in others it could be societal acceptance of gambling + gambling being readily available + erroneous cognitions or, alternatively, propensity for addiction + low income. Having said this, the pattern of risk factors within an individual is not totally random. Rather, evidence points to at least two main subtypes or routes to eventual addiction: the impulsive/antisocial pattern (often in males) versus the emotionally vulnerable pattern (often in females) (e.g., Blaszczynski & Nower, 2002; Windle & Scheidt, 2004).

This etiological framework has several important implications for prevention of problem gambling:

- The effectiveness of any prevention initiative depends on its ability to modify one or more of these risk factors, particularly the direct risk factors.
- Because of the large number of risk factors as well as the biological basis of some of them, the risk of problem gambling in a population can be reduced, but is unlikely to ever be eliminated.
- Because many of the risk factors for problem gambling are the same risk factors for the development of substance abuse, psychopathology, and other problems, generic prevention initiatives targeting a wide range of problems (especially in youth) are likely both efficient and essential components for the prevention of problem gambling.
- Because of the large number of risk factors, the effectiveness of any single prevention strategy will be limited. Indeed, effective prevention will almost certainly require a multifaceted, coordinated, and sustained array of educational and policy initiatives provided across a wide range of age groups.

Figure 1. Etiological Framework for Problem Gambling.

## METHODOLOGICAL APPROACH

The traditional way of categorizing prevention efforts is by the type of people toward whom efforts are directed. *Primary Prevention* is an effort to prevent individuals in the general populace from becoming problem gamblers. *Secondary Prevention* is an effort to prevent the development of problem gambling in individuals with risk factors for the condition. *Tertiary Prevention* is an effort to stop and potentially reverse the problems occurring in existing problem gamblers and is analogous to ‘treatment’.

However, the approach used in the present paper differs in two respects. First, the focus is primarily on initiatives intended to prevent the development or onset of problem gambling (i.e., primary and secondary prevention) rather than a more general focus on initiatives intended to reduce the harm associated with gambling. (Inherent in this strategy is the assumption that intervention which effectively prevents problem gambling will also have beneficial effects on reducing the harm caused to non-problem gamblers.) Second, initiatives are grouped according to how they are intended to work. *Educational Initiatives* are intended to change internal knowledge, attitudes, beliefs, and skills so as to prevent problem gambling. *Policy Initiatives* are intended to prevent problem gambling through the alteration of external environmental controls on the availability and provision of gambling.

The purpose of the following section is to comprehensively review what is known about the nature and effectiveness of existing educational and policy initiatives to prevent problem gambling.

A multi-stage search strategy was used to identify relevant articles. It started with the use of the keywords “*prevention*”, “*gambling*”, “*problem gambling*”, “*pathological gambling*” in the following electronic databases, restricting the search to articles published in English:

- AGRI DSPACE Repository @ the University of Calgary – <http://dspace.ucalgary.ca>
- Australian Gaming Council’s eLibrary - <http://www.austgamingcouncil.org.au/>
- Academic Search Complete
- Cochrane Database of Systematic Reviews
- DARE (EBM Reviews)
- E-Library – Responsible Gambling Council (Ontario)
- Gambling Research Australia’s Gambling Research Database - <http://www.gamblingresearch.org.au/>
- Gambling Research Database (GambLIB)- <http://www.gamplib.org/>
- Google Scholar
- Medline
- Problem Gambling Library (New Zealand) - <http://www.pgfnz.co.nz/library>
- PsycINFO
- Science Direct

The reference list in each of these articles was then consulted for additional articles.

Finally, the authors a) used an ongoing [Ingenta](#) alerting service to identify all published articles with the word 'gambling' in the title; b) scanned the literature and news stories in the weekly gambling news services provided by [NewsScan](#) (Responsible Gambling Council, Ontario), the [Global Gaming Business Magazine](#), and the newsletter of the [Global Gambling Guidance Group](#).

# EDUCATIONAL INITIATIVES

## Childhood Interventions

It is well established that negative early childhood experience significantly influences the development of problematic behaviour later in life. Accordingly, it is not surprising that interventions to strengthen families and create effective parenting practices are generally one of the most powerful ways to reduce adolescent problem behaviours, and to also serve to reduce problems at later ages (Foxcroft, Ireland, Lowe, & Breen, 2011; Kumpfer & Alvarado, 2003; Petrie, Bunn & Byrne, 2007). This approach is likely to apply equally well to the prevention of problem gambling among adolescents (and their subsequent adult years), although the approach has yet to be empirically tested. Nevertheless, there is good evidence that family-based programs are effective for the primary prevention of other addictive behaviour such as alcohol and drug use in young people (Foxcroft et al., 2011; Gates, McCambridge, Smith, & Foxcroft, 2006; Toumbourou, Williams, Waters, & Patton, 2005). It would be useful if future family/parenting interventions were to include the incidence of gambling and problem gambling among the outcome measures.

For similar reasons, it is to be expected that exposure to well socialized peer groups, supportive teachers, and good schools would have the same beneficial effect on prevention of problem gambling as it does on the prevention of other problematic behaviour (Durlak, 1997; Durlak & Wells, 1997; Nation et al., 2003; Toumbourou et al., 2005; Weissberg & Gullotta, 1997).

## Information/Awareness Campaigns

When most people think of problem gambling prevention they think of information campaigns targeted specifically at gambling. These are known variously as 'information/awareness campaigns', 'mass media campaigns' or 'social marketing'. Such initiatives are directed at the general public and usually contain information consisting of one or more of the following elements (e.g., Alberta Alcohol and Drug Abuse Commission, 2001; Jackson, Thomas, Thomason, & Ho, 2002):

- Encouragement to 'know your limits' or 'gamble responsibly'.
- Warnings about the potential addictive nature of gambling.
- Identification of the signs/symptoms of problem gambling.
- Information about where people can go for help or more information on problem gambling (i.e., treatment agencies; 24 hour telephone help-lines) ('tertiary prevention').
- Provision of the true mathematical odds of various gambling activities.
- Efforts to dispel common gambling fallacies and erroneous cognitions.
- Provision of guidelines and suggestions for problem-free gambling.

These initiatives are usually developed and delivered by governmental health or social service agencies, schools, or commercial gambling providers. The information itself is provided:

- On the gambling product (e.g., odds printed on the back of lottery tickets, 'responsible gambling messages' on electronic gambling machines, or EGMs).
- On posters and pamphlets at gambling venues and elsewhere throughout the community.
- In the form of 'public service announcements' on radio, television, and newspapers.
- By means of presentations, plays (Bell, 2004), or videos (most often presented in educational settings).
- On Interactive CDs.
- On interactive terminals in the gambling venue (e.g., 'Player Awareness Terminal')
- On government, social agency and/or gambling provider websites.

Information/awareness campaigns are relatively inexpensive ways of delivering preventive health messages to a large portion of the population, and are intended to counter the often considerable commercial efforts to promote the product. The mass media are a particularly good vehicle for reaching young people, who are estimated to spend at least as many hours watching television as they spend in formal education. Reaching young people is particularly important, as they may be more susceptible to the considerable investment in commercial advertising promoting the product (Atkin, 1995; Strasburger, 1995).

Although awareness campaigns to prevent problem gambling are relatively common across many jurisdictions, there is limited research on their impact. The existing evidence suggests that improvements in knowledge and awareness are reliably produced in people who attend to these messages. For example, a brochure on pathological gambling was found to effectively convey useful new information to members of the general public in Quebec who were shown it (Ladouceur, Vezina, Jacques, & Ferland, 2000).

Awareness initiatives appear to have a very limited impact *if people are not explicitly asked to attend* to the information or have no intrinsic interest in it. For example, Indiana implemented a statewide awareness campaign to promote responsible gambling using radio announcements, billboards, brochures, newspaper advertisements, posters, pens, and t-shirts, press conferences, and 'problem gambling town hall meetings'. Najavits, Grymala, & George (2003) found that only 8% of the general public recalled seeing or hearing any advertising. However, of that 8%, 72% reported that the advertising had increased their knowledge of problem gambling. (One percent of the total sample reported taking action, such as calling the help line, as a result of seeing/hearing the message). A similar result was obtained in Ontario, Canada. Turner, Wiebe, Falkowski-Ham, Kelly, & Skinner (2005) found that 66% of the Ontario public was unaware of any initiatives to reduce problem gambling. This is notable considering that Ontario is cited as spending proportionally more on problem gambling prevention, treatment, and research than any other jurisdiction in the world (Sadinsky, 2005). However, people who played slots and instant lotteries were significantly more likely to be report being aware of initiatives to reduce problem gambling, suggesting that gamblers may be noticing the presence of the help line number on tickets and slot machines. Also in Ontario, a media campaign to



dispel myths about how slot machines worked was successful in significantly reducing these fallacies among a random sample of 900 Ontario gamblers in February 2005 before the campaign started, compared to a random sample of 900 gamblers in April 2007 after the campaign was completed (B. Palantzas (Ontario Lottery and Gaming Corporation [OLG]), personal communication, June 6, 2007).

In 1995 the Victoria Department of Human Services in Australia initiated a state-wide problem gambling awareness program consisting of a 5-week multi-language radio, newspaper and billboard advertisement phase in the first year, a 14-week television advertisement phase in 1996, and a 30-week radio and television advertisement phase in 1997 and 1998. Jackson, Thomas, Thomason and Ho (2002) evaluated the program, concluding that it produced an increased number of callers to the gambling helpline, and an increase in the number of new clients entering treatment. In addition, there was also increased collaboration between help services and the staff at gambling venues, many of whom attended training/information sessions about problem gambling. In 2001, the Victoria government initiated a similar informational campaign which reportedly resulted in a 70% increase in calls to the helpline and a 118% increase in clients presenting themselves to treatment (Victoria Department of Human Services, 2002).

It is important to note that providing support to distressed gamblers or recruiting problem gamblers into treatment is a much less satisfactory as a 'prevention' outcome than inoculating the general public from developing gambling problems in the first place. There is no direct evidence on the effectiveness of awareness campaigns as a *primary* prevention tool for problem gambling. The general public's lack of awareness of these initiatives is not very encouraging.

There have been several evaluations of short duration school-based presentations. The Addictions Foundation of Manitoba evaluated their 45 – 60 minute gambling education and awareness presentation ("It's Your Lucky Day") among 894 grade 7 and 8 students (Lemaire, de Lima, & Patton, 2004). One month after receiving the presentation, students in the Intervention group showed improved knowledge of gambling and problem gambling and decreased gambling fallacies relative to students in the Control group. The International Centre for Youth Gambling Problems and High-Risk Behaviors (2004) in Montreal, Quebec undertook an evaluation of their interactive CDs for the prevention of problem gambling ("Hooked City" for grade 7 – 12 students and "The Amazing Chateau" for grades 4 – 6). Several months after being exposed to these interactive CDs, students had significantly improved knowledge about gambling, more awareness of the signs of problem gambling, and fewer gambling fallacies. However, there was no significant change in gambling behaviour, although a trend in this direction was found. In Ontario, a pre-post evaluation of a 60 minute program developed by the Centre for Addiction and Mental Health (CAMH) found the program significantly improved students' understanding of random chance, but did not result in any change in gambling behaviour, coping strategies, or attitudes towards gambling (Turner, MacDonald, Bartoshuk, Zangeneh, 2008). Taylor & Hillyard (2009) evaluated a 45 minute program delivered to 8,455 students in primary school, junior high and high school in the Midwestern United States.

Immediately after receiving the program students showed significant improvement in their knowledge about gambling and the negative effects it could have. Behavioural change was not measured.

Ferland, Ladouceur, & Vitaro (2002) evaluated the relative effectiveness of a 20 minute video ("Lucky") compared to a 40 minute presentation, and a combined 40 minute presentation plus video among 424 grade 7 and 8 students in Quebec. One week later, all three groups had significantly improved knowledge about gambling and decreased gambling fallacies compared to a Control group, with the combined presentation plus video group having the greatest improvement. Ladouceur, Ferland, & Vitaro (2004) evaluated the same video (translated into English) in a group of 506 grade 7 and 8 students from Quebec and New Brunswick. Here again, after one week, students in the Intervention group had improved gambling knowledge and a decrease in gambling fallacies compared to students in the Control group. The same video was also evaluated against a presentation plus video session by Lavoie & Ladouceur (2004) in a group of 273 Quebec grade 5 and 6 students. Immediately after seeing the video, students in both Intervention groups demonstrated significant improvements in gambling knowledge and a decrease in gambling fallacies compared to students in the Control group (with no greater advantage to the presentation plus video condition). Ladouceur, Ferland, Vitaro, & Pelletier (2005) evaluated the effectiveness of a different 20 minute video (focusing on the adverse consequences of excessive gambling) among 586 Quebec grade 11 and 12 students. One month later, students demonstrated improved knowledge of both gambling and problem gambling relative to a Control group. Ladouceur, Ferland, & Fournier (2003) evaluated the effectiveness of a one hour interactive presentation among 153 Quebec grade 5 and 6 students. Students who received the presentation demonstrated improved knowledge and decreased gambling fallacies relative to students in the Control group, with the effect being stronger when the session was administered by a specialist in this area, as compared to the students' regular teacher. A similar one hour interactive session was evaluated in 345 Quebec grade 7 and 8 students by Ladouceur, Ferland, Roy, Pelletier, Bussièrès, & Auclair (2004). Again, improved knowledge and decreased gambling fallacies were achieved in the Intervention group relative to the Control group.

There have been a couple of efforts to educate EGM gamblers. Wohl, Christie, Matheson, & Anisman (2010) evaluated the effectiveness of a short video that provided education on how slot machines work, the value of setting financial limits, and strategies to avoid problems. Non-problem gamblers ( $n = 242$ ) were randomly assigned to view either the educational video or a control video. A total of 130 of these individuals (46% attrition) completed an evaluation questionnaire 1 day later and again 30 days later. After one day, those who watched the educational video were significantly more likely to stay within their pre-set slot spending limits, to have fewer erroneous cognitions, to endorse strategies to avoid problematic play, and to indicate an intent to use these strategies. However, there was no difference in the actual amount of money spent on slots between the experimental and control conditions. At the 30 day evaluation the decrease in erroneous cognitions was the only effect that was maintained.

A more substantial initiative<sup>7</sup> with a more positive outcome was conducted by Doiron & Nicki (2007). These researchers delivered a two session program to 20 VLT gamblers who scored in the 'At-Risk' range on the Canadian Problem Gambling Index. Session 1 consisted of a 20 minute video providing information on gambling and problem gambling and a homework manual with a review of the presentation and exercises to practice cognitive restructuring and problem-solving. In Session 2 the homework was reviewed, further discussion occurred around the role of problem solving and faulty thinking, and a plan for the future was discussed. The program was evaluated after the second session and one month later compared to a wait-list control group of 20 people (100% retention of participants at one month). Large and significant decreases in erroneous gambling beliefs and actual gambling behaviour (# VLT sessions; non-VLT gambling sessions; VLT expenditure) occurred in the experimental group both at post-training and one month follow-up.

There is a considerable amount of literature on the utility of public education and awareness campaigns for other health behaviours that contain lessons for the prevention of problem gambling (Byrne, Dickson, Derevensky, Gupta, & Lussier, 2005). In general, research has found that sustained information/awareness initiatives have significant potential to improve people's knowledge and/or change their attitudes at a community-wide level (Carson et al., 2011; Duperrex, Roberts, & Bunn, 2002; Grilli, Ramsay, & Minozzi, 2004; Sowden, 2002). Indeed, population surveys have long been known to show that mass media are the leading source of information about important health issues, such as weight control, HIV/AIDS, drug abuse, asthma, family planning and mammography (Chapman & Lupton, 1994).

While changes in knowledge and attitudes have been fairly reliably obtained, *the ability of awareness campaigns to produce actual changes in behaviour is less common* (Bala, Strzeszynski, & Cahill, 2008; Duperrex et al., 2002; Grilli et al., 2004; Slater et al., 2005; Sowden, 2002; Stacy, Bentler, & Flay, 1994). Furthermore, the knowledge and attitudinal impact of prevention messages often decays with time, requiring that they be repeated regularly (Duperrex et al., 2002; Vidanapathirana, Abramson, Forbes, & Fairley, 2004).

Although less common, instances of clear behavioural change have sometimes been found. For example, after extensive media reports on dietary studies relating cholesterol-rich foods with heart disease, consumption of beef, eggs and fatty milk products in North America declined. Similarly, reports on the risks of excessive sodium consumption were associated with increased use of salt-free food products. A decline in the use of birth control pills and IUDs between 1970 and 1975 correlated closely with publicity about their possible adverse effects (Jones, Beniger, & Westoff, 1980). Vidanapathirana et al. (2004) found that mass-media interventions have immediate effects in promoting HIV testing. Similar positive effects have been found for cancer screening (Bish, Sutton & Golombok, 2000), and the use of sunscreen. In the gambling context, evidence of behavioural change is seen the increase in help line calls or treatment-seeking as reported by Victoria Department of Human Services (2002) and Jackson et al. (2002) (and,

---

<sup>7</sup> This initiative is better described as a training program rather than an educational session or awareness campaign.

anecdotally, by agencies in other jurisdictions when promoting these services). The commonalities to these situations are that *the information is personally relevant, the consequences of not changing behaviour are potentially severe, the benefits of adopting the behaviour are quite beneficial, the person perceives that the behavioural change required is relatively easy to achieve, and the person receives plenty of cues for action*. These necessary elements for behavioural change are elucidated in the 'Health Belief Model' (Becker, 1974; Janz, Champion, & Strecher, 2002), which has been shown to predict health behaviour in a wide variety of situations (Harrison, Mullen, & Green, 1992).

The other situation where awareness campaigns (and other *individual* educational initiatives) have greater potential to contribute to behavioural change is when they are part of more comprehensive and coordinated community-wide programs involving several other educational and policy initiatives (see Best Practice 4 under Best Practices to Prevent Problem Gambling).

### Responsible Gambling Information Centres

'Responsible Gambling Information Centres' (RGICs) located within gambling venues are a fairly new initiative. The Crown Casino in Melbourne, Victoria, Australia has operated the Crown Customer Support Centre since May 2002. In Canada, the first RGIC opened in 2003 at the McPhillips Street Casino, Winnipeg, Manitoba. Many other countries have since implemented RGICs (most beginning operations in 2005 and 2006).

The primary purpose of the RGIC is to provide, on patron request, information and education about the risks of gambling (e.g. odds of winning and losing; demonstrations/tutorials about slot machine workings/random number generation). A second purpose is to identify, support, and refer RGIC visitors who are experiencing problems with gambling. Immediate crisis intervention and counselling may be provided by on-site staff, but ongoing counselling services are not usually included in RGIC mandates. RGIC's are sometime staffed by casino employees and sometimes by employees of addiction agencies. In all jurisdictions, operational funding for RGICs has been provided either directly or indirectly by governments.

Utilization rates for RGICs appear to be fairly low by patron utilization standards, although high by treatment provider standards. Approximately 61,400 people visited one of Ontario's Responsible Gaming Centres (RGC) from 2005 to 2009 (P. Pellazarri, personal communication, July 13, 2009). However, during this same time period there were roughly 200 million visitors to Ontario casinos. Approximately 8,000 customers are reported to have accessed Manitoba's RGICs between 2003 and 2006. Of these, 75% were for information only, 10% for support and referral, and 15% for other reasons (Mehmel, 2006). By comparison, approximately 10,000 people visit Manitoba casinos every day. Significantly higher rates of contact have been reported in Alberta, where there were 100,000 customer contacts from 2006 to 2009 in their 15 provincial casinos (K.Verlik, personal communication, October 2009). The Alberta Gaming and Liquor Commission (AGLC) attributes this higher rate to a) RGIC staff being allowed on the gambling floor, and b) RGIC staff being employed by AGLC rather than Alberta Health.

A formal evaluation of the effectiveness of 2 of Ontario's RGICs found that 70% of casino patrons were aware of the RGIC's existence, and more than half of casino patrons were aware of its goals (Osborne Group, 2008). Among casino staff, 95% were aware of the RGIC and the large majority were aware of its goals. However, only 14% had ever referred a patron to the RGIC. The majority of the RGIC visitor population received information about problem gambling and/or responsible gambling, and the majority of these people rated this information as useful. Nine percent of the RGIC visitor population received a referral to a problem gambling treatment agency, but relatively few followed through on this referral (Osborne Group, 2008). An evaluation of visitors to an RGIC in Quebec (with a 28% participation rate in the evaluation survey) found that most respondents were seniors, occasional slot machine gamblers, and in control of their gambling activities. Satisfaction with the services of the RGIC was high. Finally, visits to the RGIC appeared to modify misconceptions about randomness, but did not have any immediate or long-term impact on gambling behaviour (Boutin, Tremblay, & Ladouceur, 2009).

### Statistical Instruction

As noted earlier, the advantage of awareness campaigns is their potential to reach large numbers of people. They have two main disadvantages. First, the exposure of any individual to the message is uncertain. Second, the duration of the message is quite short for people exposed to it. Thus, it is useful to examine the effectiveness of more sustained and directed educational efforts to prevent problem gambling.

It is a fairly commonsensical idea that if gamblers truly understood the negative mathematical expectation of gambling, they would be inoculated from over-involvement. There are two general areas of research that support the contention that improved knowledge of gambling probabilities should positively impact gambling behaviour. The first is research demonstrating a positive impact of educating problem gamblers in treatment on the nature of randomness, and other errors of thinking underlying gambling fallacies (e.g., Ladouceur, Sylvain, & Boutin, 2000; Ladouceur, Sylvain, Letarte, Giroux, & Jacques, 1998; Sylvain, Ladouceur, & Boisvert, 1997). The second is research that shows statistically-trained college students to be less susceptible to certain specific fallacies (Benassi & Knoth, 1993), and to have better general reasoning skills for everyday problems (Fong, Krantz, & Nisbett, 1993; Kosonen & Winne, 1995).

However, the literature specific to the impact of improved statistical knowledge on gambling behaviour is mixed, at best. Lichtenstein, Slovic and Zink (1969) found that explaining the concept of 'expected value' (EV) and making it explicit in a set of gambling tasks resulted in only one-third of subjects moving to maximize EV (the desired outcome), with one-quarter moving toward lower EVs. Schoemaker (1979) found that university students who received statistical training made superior choices in a gambling task compared to untrained students. However, Gibson, Sanbonmatsu & Posavac (1997) found that students explicitly asked to evaluate the probability of a certain sports team winning tended to overestimate the team's actual chances, and subsequently gambled more relative to students not asked to evaluate any specific team.

Similarly, Hertwig, Barron, Weber, & Erev (2004) found that students educated about the exact probabilities for events gambled on rare events more than was statistically optimal. In contrast, students who were not explicitly provided with the actual odds demonstrated a more optimal gambling strategy. Steenbergh, Whelan, Meyers, May, & Floyd (2004) found that university students who were given an explicit warning about erroneous gambling beliefs and the negative mathematical expectation of gambling gained superior knowledge about these things, but were just as likely to gamble on a roulette game compared to students not given these messages. In contrast, Floyd, Whelan, & Meyers (2006) found that viewing messages on irrational gambling beliefs caused university students to adopt less risky gambling behaviour in a computerized roulette game with imaginary money. Williams & Connolly (2006) provided 198 Introductory Statistics university students lessons on probability theory using examples from gambling as well as several laboratories providing hands-on experience with casino games. Six months after the intervention, students receiving the intervention demonstrated superior ability to calculate gambling odds as well as resistance to gambling fallacies. However, this improved knowledge and skill was not associated with any decreases or changes in actual gambling behaviour. Similarly, Lambos & Delfabbro (2007) and Delfabbro, Lahn & Grabosky (2006) found that pathological gamblers had significantly higher rates of cognitive biases, but did not differ from nonpathological gamblers in knowledge of gambling odds or numerical ability. Lastly, Pelletier & Ladouceur (2007) found that people with knowledge of mathematics had an equal number of erroneous perceptions and behaviours during gambling compared to people with much less knowledge about mathematics.

In many ways, it may be that teaching people about gambling odds is analogous to telling smokers about the harmful effects of smoking, or alcoholics about the harmful effects of drinking. Individuals involved in these behaviours are usually already aware of these facts. Knowing something and having this knowledge alter your behaviour are often two different things. While knowledge is, in most instances, a necessary antecedent to changing or preventing harmful behaviour, it is seldom sufficient on its own (e.g., Stacy, Bentler, & Flay, 1994; Williams & Gloster, 1999). Accordingly, prevention frameworks that rely heavily on providing gamblers with 'informed choices' (e.g., Blaszczynski, Ladouceur, & Shaffer, 2004; Blaszczynski, Ladouceur, Nower, & Shaffer, 2005; Blaszczynski et al., 2011) are likely to have limited preventive effect.

### **School-Based Prevention Programs**

Comprehensive and substantive elementary and high-school based prevention programs for problem gambling are relatively uncommon, but they do exist in some jurisdictions. Such programs typically have a broad scope of topics that include teaching statistical knowledge about gambling, providing information on the potentially addictive nature of gambling, explaining gambling fallacies, building esteem, and developing peer resistance skills. Examples of these types of programs are "Don't Bet On It" in South Australia for ages 6 to 9; "Gambling: Minimising Health Risks" in Queensland for grade 5 students; "Facing the Odds" in Louisiana for grades 5 to 8; "All Bets are Off" in Michigan for grades 7 and 8; "Kids Don't Gamble...Wanna

Bet” in Minnesota and Illinois for grades 3 to 8; “Youth Making Choices” for high school students in Ontario; “Count me Out” in Quebec for ages 8-17; the “Problem Gambling Prevention Program” in Florida for middle and high school students; and “Gambling: A Stacked Deck” in Alberta for grades 9-12.

There has been very little published evaluation of these programs. Gaboury & Ladouceur (1993) evaluated a 3-session program (75 minutes per session) in 289 juniors and seniors from 5 Quebec high schools. The program included an overview of gambling, discussion of legal issues, how the gambling industry manipulates the chances of winning, gambling fallacies, the development of pathological gambling, and coping skills. Six months later, students in the Intervention group had improved knowledge about gambling relative to the Control group. However, the improvement in coping skills seen immediately after training was not maintained at 6 month follow-up, nor were there any significant change in students’ actual gambling behaviour or attitudes toward gambling at either post-test or follow-up.

Ferland, Ladouceur & Vitaro (2005) evaluated a somewhat different 3-session program (60 minutes per session) with 1193 Quebec students in grades 8, 9 and 10. The program provided information about gambling activities and related misconceptions, social problem solving to resist peer pressure, and excessive gambling. Three months later, students in the Intervention group demonstrated significant improvements in knowledge about gambling and decreased gambling misconceptions relative to the Control group. However, there was no improvement in their social problem solving ability or in actual gambling participation.

Encouraging results have been obtained from a high school curriculum in Alberta called “Gambling: A Stacked Deck”. This program was pilot tested in Calgary high schools in 2001/2002 (Davis, 2003; Williams, 2002) and later revised based on the results and feedback from teachers and students. The program consists of a set of 5-6 interactive lessons (minimum 1 hour each) that address the nature of gambling; the true odds and ‘house edge’; signs, risk factors, and causes of problem gambling; and skills for good decision-making and problem-solving. An overriding theme of the program is to approach life as a ‘smart gambler’ by determining the odds and weighing the pros and cons of your actions. The program was administered to 1,253 grade 9 – 12 students in 10 schools throughout southern Alberta, with results compared to 433 students in 4 Control schools. Three to seven months after receiving the program, students had significantly more negative attitudes toward gambling, improved knowledge about gambling and problem gambling, improved resistance to gambling fallacies, improved decision making and problem solving, decreased gambling frequency, and a decreased incidence of problem gambling (Williams, Connolly, Wood, Currie, & Davis, 2004; Williams, Wood, & Currie, 2010).

While the results of this study are encouraging, the program’s ability to sustain its effectiveness over the long-term remains unknown. Moreover, it is sobering to examine literature from other fields (e.g., health promotion, tobacco, drug use, depression, eating disorders). Here, results indicate that even with comprehensive educational approaches, both short and long-term effects on the desired behaviour are often *modest* (Cuipers et al., 2008); *small* (Merzel &

D’Afflitti, 2003; Pratt & Woolfenden, 2002; Thomas, Baker, & Lorenzetti, 2007; Wandersman & Florin, 2003); or *nonexistent* (Foxcroft, 2006; Gates, McCambridge, Smith, & Foxcroft, 2006; Giesrecht, 2007; Secker-Walker, Gnich, Platt, & Lancaster, 2002).



## POLICY INITIATIVES

Policy initiatives encompass measures intended to prevent problem gambling through the introduction of external environmental controls on the availability and provision of gambling. Policy initiatives can be organized into three categories: restrictions on the general availability of gambling; restrictions on who can gamble; and restrictions on how gambling is provided. As there is considerable evidence on the impact of policy measures, the focus is primarily on research that reports changes in behaviour as measures of effectiveness.

### RESTRICTIONS ON THE GENERAL AVAILABILITY OF GAMBLING

Increases in the availability of a product are typically related to corresponding increases in use of the product, especially among products or services with dependency-forming potential. Thus, alcohol availability is positively associated with higher levels of consumption, which in turn, is correlated with higher levels of alcohol-related problems (Babor, Caetano, Caswell, et al., 2010; Cook, 2007; Cook & Moore, 2002; Gruenewald, Ponicki, & Holder, 1993; Rush, Gliksmann & Brook, 1986; Stockwell & Gruenewald, 2003). A similar relationship exists with illegal drugs (Babor, Caulkins, Edwards, et al., 2010). Similarly, jurisdictions with higher levels of gun ownership have consistently higher rates of gun-related violence (Ajdacic-Gross et al, 2006; Hepburn & Hemenway, 2004; Killias, van Kesteren, & Rindlisbacher, 2001). It is important to note that these relationships are neither perfect, nor simple. For example, there are circumstances where alcohol consumption can decrease despite increases in availability (e.g., Smart & Mann, 1995). Similarly, the relationship between gun ownership and *overall rates* of homicide and suicide is less consistent, offering some evidence of a substitution effect (i.e., using other lethal means when guns are not available) (Killias et al., 2001), although this interpretation is contested by some (Hepburn & Hemenway, 2004).

Evidence indicates that gambling availability has a similar positive, but complex relationship to problem gambling prevalence. Prior research has documented small but significant within-jurisdiction associations between the availability of gambling and the prevalence of problem gambling (Lester, 1994; National Gambling Impact Study Commission [NGISC], 1999; Pearce, Mason, Hiscock, & Day, 2008; Productivity Commission, 1999; Shaffer, LaBrie, & LaPlante, 2004; Welte, Barnes, Tidwell, & Hoffman, 2009; Welte, Wieczorek, Barnes, Tidwell, & Hoffman, 2004; Williams, Belanger & Arthur, 2011).

Furthermore, problem gambling prevalence rates started increasing in North American and Australia beginning in the late 1980s and early 1990s coincident with the most rapid introduction and expansion of EGM and casino gambling in these countries<sup>8</sup> (Williams, Volberg,

---

<sup>8</sup> This period was also coincident with the greatest increase in per capita gambling expenditure, and the introduction of specialized treatment services for problem gambling (In Canada, the first specialized treatment programs for problem gambling were developed in Alberta and New Brunswick in 1993).

& Stevens, 2012). However, it is also true that past year problem gambling prevalence rates in most countries peaked in the late 1990s/early 2000s, and there has been a general worldwide downward trend in rates since that time (Williams, Volberg, & Stevens, 2012). Considering that gambling availability has steadily increased in most jurisdictions over the past 30 years, these results provide support both to the contention that increased gambling availability is related to increased problem gambling, as well as the contention that populations tend to adapt over time (Shaffer et al., 2004; LaPlante & Shaffer, 2007; Storer, Abbott & Stubbs, 2009). There are several mechanisms likely responsible for decreasing problem gambling prevalence. They include: a) increased population awareness of the potential harms of gambling (creating less susceptibility); b) decreased overall population participation in gambling (due to greater wariness as well as the novelty having worn off);<sup>9</sup> c) people being removed from the population pool of problem gamblers due to severe adverse consequences deriving from their gambling (e.g., bankruptcy, suicide); d) increased industry and/or government efforts to provide gambling more safely, to enact programs to prevent problem gambling, and to provide treatment resources; and e) increasing age of the population (Williams, Volberg, & Stevens, 2012).

Because there is some relationship between gambling availability and problem gambling prevalence, it comes as no surprise that restricting gambling availability is a policy often used to reduce problem gambling. To this end, total gambling prohibition is one option, and does occur in a few jurisdictions such as Cuba, many Islamic countries<sup>10</sup>, and the American states of Utah and Hawaii. Discussing the pros and cons of total prohibition are beyond the scope of this paper, and, in any case, most jurisdictions opt for less drastic measures as discussed below.

### Restricting the Number of Gambling Venues

Most countries require licenses for providers, but do not specify restrictions on the number of bingo halls, horse race tracks, or lottery ticket sales outlets. It is much more common practice, however, to restrict the number of casinos and EGMs. Caps on numbers of casinos and/or gambling houses occur in Austria, Belgium (capped at 9), Italy (capped at 5, the lowest of all

---

<sup>9</sup> There is evidence that the average level of gambling activity in a jurisdiction roughly predicts the jurisdiction's level of excessive activity or problem gambling (e.g., Chipman, Govini & Roerecke, 2006; Grun & McKeigue, 2000; Hansen & Rossow, 2008, 2012; Lund, 2008). This is known as the 'single distribution theory' (Rose, 1985; Rose & Day, 1990), which has been shown to have applicability in predicting rates of problem drinking. Data derived from a recent study by Williams, Volberg & Stevens (2012) confirms that standardized past year rates of problem gambling correlates with the percentage of the population that engages in gambling in both Australian states (Kendall tau b = .28,  $p = .04$  (one-tail),  $N = 23$  pairs) as well as Canadian provinces (Kendall tau b = .30,  $p = .005$  (one-tail),  $N = 36$  pairs). However, worldwide, this relationship is nonsignificant (Kendall tau b = .12,  $p = .11$ ,  $N = 54$  countries). The failure to find a relationship in this latter case is primarily due to the fact that the highest prevalence rates of problem gambling tend to be found in Asian countries, but the prevalence rate of *gambling* in Asian countries tends to be relatively low due to low rates of participation by females.

<sup>10</sup> Afghanistan, Algeria, Bangladesh, Bhutan, Indonesia, Iran, Jordan, Libya, Mali, Oman, Pakistan, Qatar, Saudi Arabia, Somalia, Sudan, Syria, United Arab Emirates, and Yemen (Online Casino Suite, 2012).

European jurisdictions), the United Kingdom (the highest cap at over 150), the Netherlands, Portugal, Slovenia, and Sweden (European Commission, 2006). A maximum of 40 casinos is allowed in South Africa (National Gambling Board, 2005). In Canada, certain provinces (e.g., British Columbia, Ontario) have capped the number of casinos.

Venue caps make theoretical sense considering the positive association between availability and product consumption. Specific evidence of their association with problem gambling is seen in the following:

- In the U.S., the National Gambling Impact Study Commission (1999) found that living within 50 miles of a casino is associated with a 50% higher rate of pathological gambling.
- Welte, Wieczorek, Barnes et al. (2004) and Welte, Barnes, Wieczorek et al. (2007) independently demonstrated a positive relationship between problem gambling in the United States and the existence of a casino within 10 miles of the gambler's home.
- Lester (1994), in a U.S. wide study, found that the opportunity to gamble at casinos with slot machines, on sports betting, at jai alai, and in teletheatres was associated with living in a state with a greater per capita prevalence of Gamblers Anonymous (GA) chapters.
- In New Zealand, living in a neighbourhood closer to a gambling venue significantly increases the likelihood that that person has gambled and that that person is a problem gambler (New Zealand Ministry of Health, 2008; Pearce et al., 2008).
- Shaffer, LaBrie and LaPlante (2004) examined county-level prevalence estimates from the 2000/2001 survey in Nevada in relation to casino availability and found that the four counties with the greatest access to casinos had the highest problem gambling rates, and the four with the least availability had the lowest rates.
- Storer, Abbott and Stubbs (2009) conducted a meta-analysis of 34 surveys completed in the Australian states and territories and in New Zealand to examine the relationship between density of EGMs and the prevalence of problem gambling. They found that the prevalence of problem gambling increased with increasing density of EGMs at a rate of about 0.8 problem gamblers for each additional EGM.
- Williams, Belanger & Arthur (2011) analyzed data from the 2008 and 2009 Alberta prevalence studies and found that while residential proximity to casinos was consistently and statistically related to problem gambling prevalence, the magnitude of the relationship was small.
- Within Canada, Table 1 presents data demonstrating a significant positive relationship between provincial casino/racino density and provincial rates of problem gambling in 2002. There are also positive relationships between problem gambling rates and the density of bingo licenses and horse racing venues. Interestingly, there is no association with the number of EGM locations, and there is a negative association with the number of lottery outlets.

Table 1. Correlation between Gambling Venue Density and Canadian Provincial Problem Gambling Prevalence in 2002.

	PEI	QU	ONT	NF	NB	BC	NS	AB	SK	MB	Correlation with PG Prevalence
Problem Gambling Prevalence <sup>1</sup>	0.9	1.0	1.2	1.3	1.4	1.6	1.6	1.7	2.3	2.4	
Casino/Racinos (C/R) per 100000 adults	0	.12	.26	0	0	.59	.27	.77	.94	.46	$r = .75^*$ $\tau\text{-}b = .63^*$
Bingo Licenses per 100000 adults	37	40	22	138	57	N.A.	74	105	230	56	$r = .56$ $\tau\text{-}b = .44^*$
Horse Racing Venues per 100000 adults <sup>2</sup>	1.91	.60	1.11	.24	.68	.65	1.36	2.26	1.21	2.30	$r = .40$ $\tau\text{-}b = .36$
# locations EGMs occur outside C/Rs per 100000 adults	87	62	0	138	111	0	73	50	93	67	$r = .01$ $\tau\text{-}b = -.07$
Lottery Outlets per 100000 adults	177	180	113	323	175	128	181	90	104	97	$r = -.50$ $\tau\text{-}b = -.45^*$

1. As established by a Canadian Problem Gambling Index (CPGI) score of 5 or higher (Note: a score of 5 provides the best demarcation of clinically assessed problem gambling, Williams & Volberg, 2010). The CPGI was administered as part of the Canadian Community Health Survey (1.2) (May – Sept 2002;  $n = 34,770$ ).
2. Racetracks and Teletheatres.

\* Correlation significant at the .05 level (1 tailed)

Note. All data come from the Canadian Gambling Digest, published by the Canadian Partnership for Responsible Gambling (2004) and the 2001 Statistics Canada Census. All data from the Canadian Gambling Digest pertains to the period April 2002 to March 2003.

Provinces are Alberta (AB), Manitoba (MB), New Brunswick (NB), Newfoundland & Labrador (NF), Nova Scotia (NS), Ontario (ONT), Prince Edward Island (PEI), Quebec (QU), and Saskatchewan (SK).

Before versus after comparisons assessing the impact of the introduction of casinos on subsequent problem gambling prevalence rates is also relevant. A comprehensive review of the 33 studies that examine this issue was recently completed by Williams, Rehm, & Stevens (2011). Overall, 22 studies found that the introduction of a casino was associated with a subsequent increase in problem gambling and/or related indices (i.e., bankruptcies, treatment numbers, suicides, divorces, child neglect), while 11 studies found no impact. An important sub-pattern to these results is that increases in problem gambling and related indices were most likely to be found in studies that examined impacts within a short period of time after the initial introduction of casinos, and less likely to be reported in studies that examined impacts over longer time frames. Similarly, studies finding an impact tended to be conducted during the 1980s and 1990s (a time when gambling was first being introduced), whereas studies failing to find an impact tended to be conducted in the 2000s (i.e., after the populace had already had

extended exposure to gambling) (Williams, Rehm, & Stevens, 2011). One of the few *longitudinal* studies in this review (Jacques & Ladouceur, 2006) specifically found a one year effect that had subsequently disappeared after both 2 year and 4 year intervals. Other studies in this review found that increases in problem gambling subsequent to casino introduction only occurred in regions without prior access to a casino, with no impact in regions where casinos were already available (e.g., Blue Thorn Research, et al., 2007).

### **Restricting More Harmful Types of Gambling**

Governments commonly adopt policies that prohibit or restrict inherently more “dangerous” or potentially harmful forms of a product. For example, handguns, assault rifles, and automatic weapons are prohibited in many countries, while hunting rifles can be owned legally. Similarly, drugs with greater perceived addictive potential (e.g., cocaine, methamphetamine, heroin) are usually illegal, while psychoactive substances perceived as less harmful are either controlled (e.g., prescription drugs) or legally available but regulated (e.g., alcohol). In the substance abuse field it is well established that there are certain drugs that have a greater harm potential (van Amsterdam, Best, Opperhuizen, & de Wolff, 2004; Nutt, King, Saulsbury, & Blakemore, 2007) and certain alcoholic beverages that bear a stronger relationship with whether a person becomes a heavy drinker (Gronbaek, Jensen, Johansen, Sorensen, & Becker, 2004; Jensen et al., 2002).

Under the same principles, it seems reasonable that policies to reduce gambling-related harm should include restrictions on the most dependency-prone forms of gambling. As described below, certain forms of gambling have these characteristics that may warrant greater restriction.

Even so, it is also important to recognize that addicts tend to be versatile in the products they consume. Although problem drinkers often have a preferred beverage, they nonetheless consume a wide range of alcoholic beverages. Similarly, drug abusers usually consume a wide range of substances in addition to the one that is causing the most problems. Hence, it should not be surprising to find that 44% of all problem gamblers in Alberta reported there was no particular form of gambling most responsible for their problems in the 2008 and 2009 Alberta prevalence surveys (Williams, Belanger, & Arthur, 2011). In a separate study, Wood & Williams (2011, 2012) found that 42% of Canadian Internet problem gamblers and 46% of international Internet problem gamblers reported there was no particular form of gambling (either land-based or online) that contributed to their problems more than others.

### **Continuous Forms of Gambling**

From a theoretical perspective, forms of gambling that can be played quite rapidly and that provide a high frequency of reinforcement (‘continuous forms’) should be the most problematic (Parke & Griffiths, 2007; Welte, Barnes, Wieczorek, Tidwell, & Hoffman, 2007). This is analogous to drug addiction, where speed of effect (e.g., injection or inhalation versus

ingestion) and drug half-life are potent determinants of the dependency-forming potential of different substances (Nutt et al., 2007).

Automated “**electronic gambling machines (EGMs)**” (i.e., slot machines, video lottery terminals (North America); fixed odds betting terminals, fruit machines (U.K.); pokies (Australia); pachinko (Japan); electronic bingo machines, etc.) epitomize continuous play and are the form of gambling most often identified by problem gamblers, treatment agencies, and gambling researchers in Western countries as creating the most problems (e.g., Dowling, Smith, & Thomas, 2005; Brooks, Ellis, & Lewis, 2008; Meyer, Hayer, & Griffiths, 2009; Williams, Volberg, & Stevens, 2012) (see also Welte, Barnes, Wieczorek et al., 2007; Welte, Wieczorek, Barnes et al., 2004).

Two other forms of continuous gambling with a greater theoretical propensity for addiction are **casino table games and ‘continuous’ lotteries**. EGMs are essentially lottery machines that initiate a new draw with every play or spin. ‘Continuous lotteries’ have a draw every few minutes throughout the day (e.g., ‘electronic keno’, ‘Rapido’) are slower variants on this and theoretically have correspondingly similar addictive potential. ‘Rapido’ has a documented association with problem gambling in France (Valleur, 2009). Casino table games (e.g., baccarat, blackjack, roulette, craps) are another type of gambling with continuous play and a high frequency of reinforcement. These games (particularly baccarat) are often identified as the most problematic form of gambling in Asian countries (Ka-Chio Fong & Orozio, 2005; Tang, Wu, & Tang, 2007; Teo, Mythily, Anantha, & Winslow, 2007; Wong & So, 2003; Williams, Volberg, & Stevens, 2012) and also tend to have an elevated association with problems in Western countries (Welte et al., 2007; Williams, Volberg, & Stevens, 2012).

Table 2 illustrates the strong association between EGM and casino table game density with Canadian provincial problem gambling prevalence in 2002. (Note: problem gambling is established by a Canadian Problem Gambling Index (CPGI) score of 5 or higher, as this provides the best demarcation of clinically assessed gamblers, Williams & Volberg, 2010. The CPGI was administered as part of the Canadian Community Health Survey (1.2) (May – Sept 2002;  $n = 34,770$ ). Game density data pertains to the period April 2002 to March 2003 and comes from the Canadian Gambling Digest, published by the Canadian Partnership for Responsible Gambling (2004)).

Table 2. Correlation between Game Availability and Canadian Provincial Problem Gambling Prevalence in 2002.

	PEI	QU	ONT	NF	NB	BC	NS	AB	SK	MB	Correlation with PG Prevalence
Problem Gambling Prevalence	0.9	1.0	1.2	1.3	1.4	1.6	1.6	1.7	2.3	2.4	
EGMs per 100000 adults	388	341	213	633	433	102	591	471	758	807	$r = .66^*$ $tau-b = .45^*$
Casino Table Games per 100000 adults	0	3.6	5.9	0	0	12.1	7.6	17.5	13.6	7.8	$r = .62^*$ $tau-b = .58^*$

\* Correlation significant at the .05 level (1 tailed).

Provinces are Alberta (AB), Manitoba (MB), New Brunswick (NB), Newfoundland & Labrador (NF), Nova Scotia (NS), Ontario (ONT), Prince Edward Island (PEI), Quebec (QU), and Saskatchewan (SK).

This same strong relationship between EGM density and regional rates of problem gambling has been documented in Australia (Productivity Commission, 1999; South Australian Centre for Economic Studies [SACES], 2005; Storer, Stubbs, & Abbott, 2009). Table 3 illustrates the relationship for the year 1999 (last time a national survey was conducted in Australia). (Note: problem gambling prevalence established by a South Oaks Gambling Screen (SOGS) score of 5 or higher. The SOGS was administered in 1999 to a sample of 10,525. EGM data comes from the 1999 World Count of Gaming Machines (Taylor Nelson Sofres, 1999). Note also that # of people per EGM used in this table is the inverse of EGMs per person).

Table 3. Correlation between EGM Availability and Australian State/Territory Problem Gambling Prevalence in 1999.

	TAS	WA	QLD	NT	ACT	VIC	SA	NSW	Correlation with PG Prevalence
Problem Gambling Prevalence	.44	.70	1.88	1.89	2.06	2.14	2.45	2.55	
# People per EGM	198	1576	116	158	71	158	117	71	$r = -.60 (p = .06)$ $tau-b = -.52^*$

\* Correlation significant at the .05 level (1 tailed).

Tasmania (TAS), Western Australia (WA), Queensland (QLD), Northern Territory (NT), Australian Capital Territory (ACT), Victoria (VIC), South Australia (SA), New South Wales (NSW).

Across countries, however, the association between a country's EGM density and their *standardized*<sup>11</sup> problem gambling prevalence rate is in the opposite direction (Kendall  $\tau b = -.18, p = .03, 1 \text{ tail}, 55 \text{ pairs}$ ). Table 4 documents this relationship using data taken from Williams, Volberg & Stevens (2012). One thing that weakens this association is that some of the highest problem gambling prevalence rates occur in Asian countries with low EGM densities (casino table games and sports betting are stronger correlates of problem gambling in these jurisdictions). Another is the fact that the lowest problem gambling prevalence rates tend to occur in European countries which often have high densities of EGMs, but with much lower bet and win sizes compared to other countries.

Table 4. Worldwide Relationship between EGM Availability and Standardized Problem Gambling Prevalence.

Jurisdiction	Year	Standardized Past Year Problem Gambling Prevalence	People per EGM
Netherlands	2004	.50	2579
Denmark	2005	.50	286
Norway	2008	.50	50000 <sup>12</sup>
Germany	2006	.60	407
Germany	2009	.61	388
Germany	2007	.62	407
Norway	2002	.70	150
Great Britain	2007	.70	223
Germany	2011	.75	388
Norway	1997	.80	155
Great Britain	1999	.80	236
Germany	2009	.84	412
South Korea	2011	.84	32796
South Korea	2007	.90	36878
New Zealand	1999	1.00	255
Switzerland	2005	1.00	659
New Zealand	2007	1.00	197
Iceland	2007	1.00	280
Hungary	2007	1.00	304

<sup>11</sup> Williams, Volberg & Stevens (2012) have produced standardized rates of problem gambling for all jurisdictions by using the original obtained rate and then adjusting for: the specific assessment instrument, time frame used, administration format, and survey description.

<sup>12</sup> Arbitrarily set to 50,000 (i.e., the highest value in the column) as there were no EGMs in these jurisdictions in that year.



Jurisdiction	Year	Standardized Past Year Problem Gambling Prevalence	People per EGM
Germany	2011	1.00	388
France	2010	1.09	3657
Germany	2009	1.13	412
Canada	2002	1.20	436
New Zealand	2004	1.20	158
Iceland	2005	1.20	280
Norway	2008	1.23	50000 <sup>12</sup>
Great Britain	2010	1.30	251
Norway	2010	1.35	1686
Sweden	1998	1.40	1114
United States	2003	1.50	426
Sweden	2009	1.50	1017
Finland	2011	1.50	271
Estonia	2004	1.60	990
United States	1998	1.70	468
Norway	2005	1.70	151
Canada	2007	2.00	377
Finland	2003	2.10	338
Estonia	2006	2.10	1182
Canada	2000	2.20	570
Italy	2008	2.30	291
Switzerland	1998	2.40	834
Finland	2007	2.40	277
Belgium	2006	2.80	384
Singapore	2010	3.10	2351
N. Ireland	2010	3.30	457
Singapore	2008	3.50	2277
Australia	1999	3.90	105
Hong Kong	2011	4.40	50000 <sup>12</sup>
United States	2000	4.60	468
Hong Kong	2005	4.80	50000 <sup>12</sup>
Singapore	2005	4.90	2433
Macau	2003	6.00	550
South Africa	2008	6.40	2075
Hong Kong	2001	7.60	50000 <sup>12</sup>

EGMs are prohibited or not available in many jurisdictions. The World Count of Gaming Machines reports that EGMs were not available in 40% (94/235) of countries in 2010 (32/51 Asia-Pacific countries, 0/2 North American countries, 13/50 Central and South American countries, 23/75 European and Middle Eastern countries, and 26/57 African countries (Taylor Nelson Sofres, 2011). In Canada they are available in all 10 provinces, but not in the territories of Nunavut or the North West Territories. In the United States they are available in 38 states, but not currently in Arkansas, Georgia, Hawaii, Kentucky, Massachusetts, New Hampshire, Ohio, South Carolina, Tennessee, Utah, Vermont, or Virginia (American Gaming Association, 2012)<sup>13</sup>. In Australia they are available in all states and territories. In Europe they are currently available in all countries except Andorra, Greenland, Liechtenstein, San Marino, and Vatican City (Taylor Nelson Sofres, 2011).

There is some empirical evidence regarding the impact of EGM bans in two American states: South Dakota and South Carolina. In 1994, South Dakota's 7,859 legal EGMs were declared unconstitutional, shut down for three months, and then reinstated by public referendum. In the 11 months prior to the ban, 4 substance abuse treatment centres averaged 68 inquiries and 11 problem gambling clients per month. During the shutdown, there were only 2 inquiries and 2 people treated among all four centres. In the 3 months after EGM reinstatement, the centres averaged 24 inquiries and treated 8 gamblers per month (Carr, Buchkoski, Kofoed, & Morgan, 1996).

In 2000 the 36,000 legal EGMs in South Carolina were banned. Following the ban there was a significant increase in seizures of illegal machines, from 48 in 2000-2001 to 1,551 in 2004-2005 (South Carolina Law Enforcement Division, 2005). Nonetheless, the number of active Gamblers Anonymous groups fell from 32 to 16 within 90 days of the shutdown, with several of the remaining active groups reporting the size of their group meetings decreasing from 40 to 1 or 2 (Bridwell & Quinn, 2002). Additionally, the most active gambler's hotline in the state reported that calls fell from 200 a month to zero. These reductions have been maintained in subsequent years. Current directory information for Gamblers Anonymous (2012) lists 7 active GA groups in South Carolina, a drop from 10 active groups in 2006 (Gamblers Anonymous, 2012).

In another "natural experiment," the Norwegian government instituted a complete ban on 12,000 privately controlled slot machines in July 2007 as part of a move toward replacing these EGMs with government controlled EGMs in January 2009. When the ban was implemented, the number of calls to the national helpline fell by 38% and treatment seeking was reduced by 52% (Engebø & Gyllstrøm, 2008). A prospective study of 1293 EGM gamblers found that 4 months after the ban there was a significant reduction in problem gambling (primarily among men), EGM gambling, as well as participation in most other forms of gambling (primarily among low intensity gamblers) (Lund, 2009). There was, however, a small but statistically significant increase in participation in Internet gambling, from 22.6% to 25.4% (Lund, 2009). Similarly,

---

<sup>13</sup> Georgia has 2 riverboat casino cruises and South Carolina has 3. Small numbers of 'instant racing machines' are available in Arkansas and Kentucky (Aug 2011). These are machines that offer wagering on historic horse races. Georgia has 2 riverboat casino cruises and South Carolina has 3.

population surveys by the organization SINTEF in 2007 (before the ban) and 2009 (after the ban had ended) found that half of slot machine users either significantly reduced or completely ceased to gamble for money (Øren & Leistad, 2011).

It appears that reductions in EGM numbers do not have a significant impact if they do not substantially change overall EGM availability. A study by South Australian Centre for Economic Studies (2005) investigated the impact of regional restrictions on EGM numbers in the state of Victoria. Findings indicated that gambler losses were not generally reduced, help-seeking by problem gamblers did not change, and there were no sustained revenue losses in venues where machines had been removed. However, the authors pointed out that the areas with new caps tended to be areas with the highest EGM per capita ratios to begin with, and the magnitude of the reductions was small. Similarly, a 15% reduction in the number of EGMs in South Australia found very little evidence of behavioural changes or reduction in EGM revenue (Delfabbro, 2008). A 25% reduction in EGMs outside casinos ('video lottery terminals') in Nova Scotia, Canada in November 2005 is said to have resulted in a relatively small reduction in revenue (Flinn, 2006).

### Internet Gambling

Theoretically, Internet gambling should also have a higher risk potential because of its 24 hour accessibility (anything that significantly increases gambling availability significantly increases risk) in conjunction with its provision of online forms of continuous gambling (e.g., Meyer, Fiebig, Hafeli, & Morsen, 2011). The the ability to play while intoxicated, the enhanced privacy it offers (see EGM Privacy section), and the lack of responsible gambling practices on the majority of online sites represent additional contributing factors (Griffiths, 2012; Williams, Wood & Parke, 2012a; Wood, Williams & Parke, 2012).

Indeed, Internet gamblers have significantly higher rates of problem gambling compared to non-Internet gamblers (Williams & Wood, 2007a; Wood & Williams, 2007a, 2007b, 2009; Wood, Williams & Parke, 2012). However, it has been pointed out that this relationship exists primarily because problem gamblers are versatile gamblers who tend to engage in a wide variety of gambling formats that will often include Internet gambling (Wood & Williams, 2009; Wood, Williams & Parke, 2012).<sup>14</sup> The association between Internet gambling and problem gambling is usually nonsignificant when controlling for number of gambling games engaged in (Halme, 2011; LaPlante, Nelson, LaBrie, & Shaffer, 2009; Vaughan-Williams, Page, Parke, & Rigbye, 2008; Welte, Barnes, Tidwell, & Hoffman, 2009).

However, cross sectional analysis does not disentangle the temporal course of events that may differentiate online gambling from other forms (i.e., although gamblers add many different forms of gambling on their path to problem gambling, the addition of certain forms (e.g.,

---

<sup>14</sup> Problem gamblers appear to adopt all new forms of gambling more quickly than nonproblem gamblers. For example, the newest forms of gambling in the United Kingdom ('spread betting' and 'fixed odds betting terminals') had the highest association with problem gambling in the 2007 U.K. prevalence survey (Wardle et al., 2007).

Internet gambling) may be more likely to immediately precipitate disordered gambling compared to other forms). Longitudinal analysis is the only way of disentangling such issues. The limited existing longitudinal evidence shows that although many problem gamblers gravitate to Internet gambling, a more common pathway is for Internet gambling to precede the development of problem gambling or for it to develop simultaneous with problem gambling (Wood, Williams & Parke, 2012).

Several countries explicitly prohibit most or all forms of online gambling. These include Bermuda, Cambodia, China, Cuba, Germany, Greece, India, Malaysia, Romania, South Africa, and the Ukraine (Williams, Wood, & Parke, 2012a).<sup>15</sup> However, a more common approach is for countries to place restrictions on Internet gambling. For example, many countries allow certain forms (most typically online lotteries, instant lotteries, sports betting, and horse racing) and make other forms illegal (most typically, casino games). This occurs in: Australia, Belgium, Brazil, Canadian provinces, Chile, Czech Republic, Denmark, Finland, France, Hong Kong, Hungary, Iceland, Israel, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Macau, Netherlands, New Zealand, Norway, Poland, Portugal, Russia, Singapore, Slovenia, South Korea, Sweden, Switzerland, Taiwan, and the United States. Several jurisdictions allow participation in online gambling from domestic sites, but prohibit accessing online gambling located outside the country (Austria, Belgium, Denmark, Estonia, France, Germany, Hong Kong, Hungary, Israel, Italy, Norway, Slovenia, South Korea, and the United States). Some countries go further and restrict patronage of domestic online sites to residents only (Austria, Canadian provinces, Finland, Philippines). Finally, a few countries permit online gambling, but prohibit their own residents from accessing these sites (e.g., Australia for online casinos, Malta, Papua New Guinea) (Williams, Wood, & Parke, 2012a).

There are three primary legal approaches to limiting illegal online gambling. The most common approach is legislation which prohibits consumers from participation (whether it be any form of online gambling or accessing foreign online gambling sites) (Williams, Wood, & Parke, 2012b). However, the deterrent effect of these laws is likely very modest, as very few jurisdictions have active enforcement.<sup>16</sup> Another approach is to legally prohibit financial institutions from processing payments to online (usually foreign) gambling sites. This approach is currently used in Belgium, Estonia, France, Hungary, Israel, Malaysia, Netherlands, Norway, and the U.S. Here again, the deterrent effect is likely quite modest, considering that there are many foreign financial intermediaries that provide a means to circumvent these rules (some of which have been created to meet this need) (Wood & Williams, 2009). A final approach is to legally constrain what citizens have access to via their Internet Service Provider (ISP). In 2006 Italy became the first country to require all Italian ISPs to block local access to a “blacklist” of foreign online gambling sites. Several other Western countries have since enacted similar legislation:

---

<sup>15</sup> In addition, many (predominantly Islamic) countries ban online gambling by virtue of their ban on all forms of gambling: Afghanistan, Algeria, Bangladesh, Bhutan, Indonesia, Iran, Jordan, Libya, Mali, Oman, Pakistan, Qatar, Saudi Arabia, Somalia, Sudan, Syria, United Arab Emirates, and Yemen (Online Casino Suite, 2012).

<sup>16</sup> Nonetheless, the prevalence of Internet gambling in each country roughly parallels its legal availability/sanctioning (Wood & Williams, 2009).

Belgium, Denmark, Estonia, France, Germany, Israel, Italy, and Slovenia. Although it is not especially difficult for technologically sophisticated people to circumvent ISP blocking, this approach may have a somewhat greater deterrent effect than financial blocking or laws prohibiting consumer participation (Williams, Wood, & Parke, 2012b).

### **Restricting the Number of Gambling Formats**

Statistically, the variable that often has the strongest association with problem gambling is not the preferred form of gambling, or proximity to gambling, but rather, the number of games in which a person engages (e.g., Williams, Volberg, & Stevens, 2012; Wood & Williams, 2012). This may be because gambling versatility is a characteristic feature of problem gambling. This is similar to the observation that although problem drinkers may have a preferred drink, many types of alcohol are usually consumed.

Even if versatility is characteristic of problem gamblers, it does not preclude limiting the number of gambling formats available so as to reduce the harm (i.e., in the same way that limiting money or time spent gambling would be helpful). Unfortunately, there is no research or cross-jurisdictional comparisons of this issue. Although there are many jurisdictions that limit certain forms of gambling there are no jurisdictions that have a maximum number of permissible formats.

### **Restricting Gambling to Dedicated Gambling Venues**

“Convenience gambling”, whereby gambling is available outside dedicated venues, is sometimes cited as an important contributing factor for problem gambling. Worldwide, it is typical for bingo, horse racing, and casino table games to occur in dedicated venues. Separate sports betting shops are also common in Europe and Australia. In contrast, it is a common practice for the purchase of lottery tickets and instant win tickets to occur in a range of retail outlets. The main source of variation (and scientific focus) concerns the placement of EGMs, which are restricted to dedicated gambling venues in some countries but occur in a wide variety of venues in other jurisdictions.

Many European countries permit EGMs outside of dedicated gambling venues. EGMs can be found in:

- bars (Belgium, Denmark, Finland, Germany, Hungary, Iceland, Italy, Netherlands, Norway, Spain, U.K.)
- arcades and clubs (Belgium, Denmark, Finland, Germany, Hungary, Lithuania, Netherlands, Slovenia, U.K.)
- restaurants (Denmark, Finland, Germany, Hungary, Iceland, Netherlands, Norway, Spain)
- hotels (Germany)
- and various types of retail outlets (e.g., gas stations, supermarkets, video rental stores) (Finland, Iceland).

Prior to 2000 the Netherlands also had EGMs in bowling alleys, sport canteens, and snack bars. Prior to 2007 Norway had EGMs in shopping centres, grocery stores, and cafes. Prior to 2005 Switzerland had EGMs in amusement arcades, restaurants and bars. Prior to 2009 Poland had EGMs in restaurants, bars, clubs, shops and service stations. The European countries that currently prohibit EGMs outside of dedicated gambling establishments are Estonia, France, Greece, Luxembourg, Poland, Portugal, and Switzerland. In addition, they are banned from 'low barrier' locations (e.g., bars; lounges; clubs) in Lithuania, Latvia, and the Netherlands (European Commission, 2006).

In Australia, all states and territories permit EGMs outside casinos with the exception of Western Australia.

In Canada, 2 out of 10 provinces do not permit EGMs outside of gambling venues: Ontario and British Columbia.<sup>17</sup>

In contrast, in the United States, only 6 states allow EGMs outside of gambling venues: Louisiana, Montana, Nevada, Oregon, South Dakota and West Virginia.

The unique impact of limiting gambling opportunities to dedicated venues is difficult to determine, as jurisdictions with the policy also tend to have other restrictive policies as well (e.g., Western Australia). A more common problem is that jurisdictions with the policy often compensate by having many more 'dedicated gambling venues' so that the actual physical availability/proximity of EGM gambling is not significantly different. For example, France had 197 in 2012, more than any other European country. Similarly, Estonia, with a population of only 1.3 million had 168 casinos in 2009 (Laansoo & Niit, 2009). Greece has recently announced an intent to create 819 'mini-casinos' (Yogonet.com, 2011). In the United States, the largest number of casinos tends to be found in states that do not permit EGMs outside of dedicated gambling venues. For example, California has 162 dedicated venues, Oklahoma has 109, and Washington has 149 (American Gaming Association, 2012). In Canada, Ontario and British Columbia have historically permitted more casinos/racinos than any other province.<sup>18</sup> This circumstance likely explains why residents of these two provinces patronize EGMs within casinos/racinos at a higher rate than any other province. In Ontario, 27% of adults had gambled on venue-based EGMs in Ontario (Williams & Volberg, in preparation) and 22% in British Columbia in 2007 (Canadian Partnership for Responsible Gambling, 2008).

As seen in Table 1, the overall relationship is relatively weak between provincial problem gambling prevalence rates in Canada for 2002 (CPGI 5+), and the number of EGMs outside of gambling venues per capita ( $r = .37$ , ns), and nonexistent between problem gambling prevalence rates and the number of EGM locations per capita ( $r = .01$ , ns) (this is true even when removing Ontario and British Columbia from the correlations). In the United States, there

---

<sup>17</sup> However, Native reserves in Nova Scotia often have VLTs in gas stations, laundromats, and convenience stores.

<sup>18</sup> In recent years Alberta has had a similar number of casinos/racinos to British Columbia and Ontario.

is no significant difference in the average standardized rates of problem gambling in states that have historically had EGMs outside casinos (Louisiana, Montana, Nevada, Oregon, South Dakota; prevalence = 2.3%) compared to states without EGMs outside casinos ( $n = 23$ , prevalence = 2.2%),  $t(26) = .22, p = .83$  (data taken from Williams, Volberg, & Stevens, 2012).

Table 5. Correlates of Canadian Provincial Problem Gambling Prevalence in 2002.

	QU	PEI	ONT	NF	NB	BC	NS	AB	SK	MB	Correlation with PG Prevalence
Problem Gambling Prevalence	1.0	0.9	1.2	1.3	1.4	1.4	1.6	1.7	2.3	2.4	
EGMs outside of casinos/racinos per 100000 adults	237	388	0	633	433	0	441	255	507	582	$r = .37$ $tau-b = .30$
# locations EGMs occur outside casinos/racinos per 100000 adults	62	87	0	138	111	0	73	50	93	67	$r = .01$ $tau-b = -.07$

Provinces are Alberta (AB), Manitoba (MB), New Brunswick (NB), Newfoundland & Labrador (NF), Nova Scotia (NS), Ontario (ONT), Prince Edward Island (PEI), Quebec (QU), and Saskatchewan (SK).

These results are somewhat surprising considering the fact that increasing the number of alcohol outlets per capita tends to increase alcohol consumption (Babor, Caetano, Casswell, et al., 2010; Stockwell et al., 2009; Wagenaar & Holder, 1995; Wagenaar & Langley, 1994). However, what the present results perhaps indicate is that each available EGM represents an independent 'outlet' as opposed to each place where EGMs are located. Thus, total EGMs per capita may continue to be a much better predictor of jurisdictional problem gambling prevalence rates. A corollary of this point is that concentrating gambling opportunities within gambling venues may simply result in corresponding local concentrations of problem gambling (e.g., Shaffer et al., 2004).

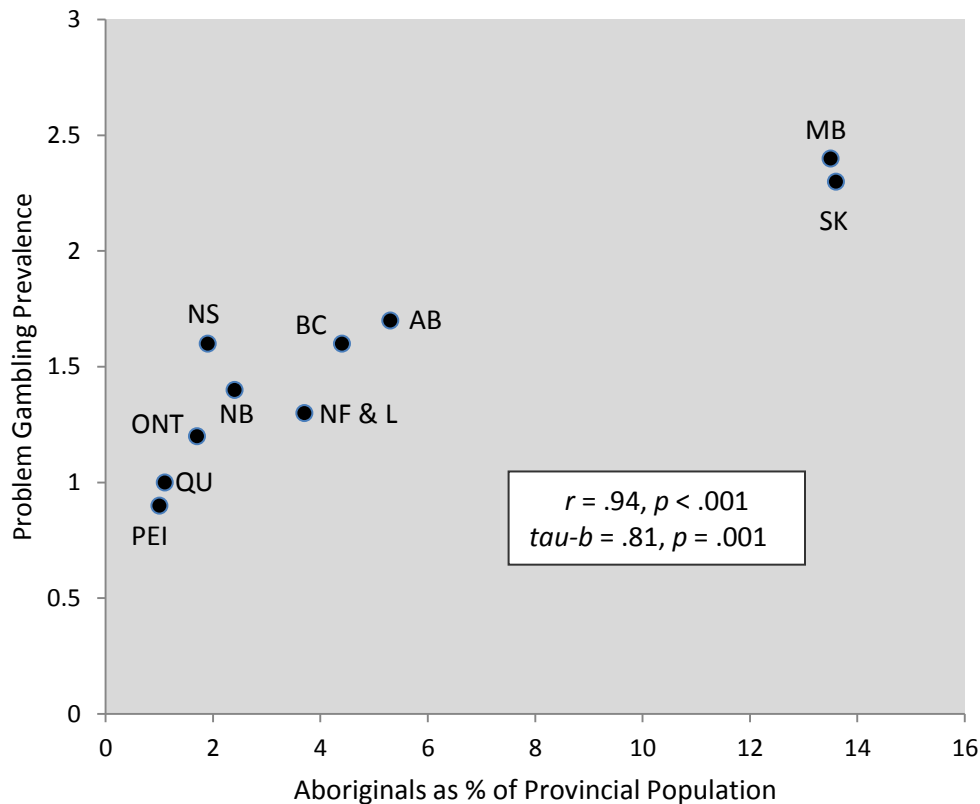
## Restricting the Location of Gambling Venues

Historically, casinos in Europe and the United States were placed in tourist destinations away from major urban centres. This is still largely the case in Asia and Africa. The historical rationale was that a) the economic benefits of casinos are strongest when they draw new money and wealth into the community rather than simply redirecting local money (Williams, Rehm, & Stevens, 2011), b) casinos would be deleterious for urban, working-class populations, and c) social problems created by gambling go home with the tourist, rather than impacting local social service and health care system (Grinols, 2004; Williams, Rehm, & Stevens, 2011). Although it is true that this strategy partly just shifts the harm to out-of-jurisdiction residents, the actual impact on tourists would be offset by the fact that most of these individuals will not be able to regularly patronize the facilities they are visiting, and people with the financial means to travel may be less susceptible to gambling addiction.

An additional consideration in the placement of gambling venues is that some groups of urban residents are much more susceptible to problem gambling than others. For example, poorer neighbourhoods and lower incomes are positively associated with problem gambling (Welte et al., 2004; 2007; Williams, Volberg, & Stevens, 2012). In addition, Rush, Veldhuizen, & Adlaf (2007) found that substance abuse and demographic factors were the strongest regional predictors of problem gambling status in Ontario (stronger than gambling venue proximity). In Canada, the national prevalence study of gambling in 2002 (Canadian Community Health Survey (CCHS) 1.2), additionally found that people with less education, and those of Aboriginal descent have significantly higher risk of problem gambling (Marshall & Wynne, 2003). As seen in Figure 2, problem gambling prevalence rates in the Canadian provinces are in fact *best* predicted by proportion of the population with Aboriginal ancestry ( $r = .94, p < .01$ ). Almost equally strong is the relationship between provincial rates of alcohol dependence (established in the same CCHS 1.2 survey) and problem gambling prevalence ( $r = .71, p < .05$ ).



Figure 2. Aboriginal Ancestry as it Relates to Canadian Provincial Problem Gambling Prevalence in 2002.



Problem gambling prevalence is established by a Canadian Problem Gambling Index (CPGI) score of 5 or higher (Williams & Volberg, 2010). The CPGI was administered as part of the Canadian Community Health Survey (1.2) (May – Sept 2002;  $n = 34,770$ ).

Provinces are Alberta (AB), Manitoba (MB), New Brunswick (NB), Newfoundland & Labrador (NF), Nova Scotia (NS), Ontario (ONT), Prince Edward Island (PEI), Quebec (QU), and Saskatchewan (SK).

Aboriginal population figures from the Statistics Canada 2001 Census.

### Limiting Gambling Venue Hours of Operation

Policies to limit the number of hours that patrons may gamble in any 24 hour period are intended to reduce harm associated with extended play. There is wide variation in this policy with some jurisdictions requiring gambling venues to be closed during certain hours and other jurisdictions allowing 24 hour operation. In Australia, all states and territories except Western Australia currently require a 4 – 6 hour break every 24 hour period (Australian Department of Families, Housing, Community Services and Indigenous Affairs (DFHCSIA) 2012). Prior to 2000 most Australian states had no requirement for shutdown.

Information is very limited regarding the effectiveness of hours-of-operation restrictions. McMillen & Pitt (2005) found that a mandatory 3 hour shutdown of EGMs in the Australian Capital Territory between 4:00am to 7:00am (implemented in September 2001) had a self-reported beneficial effect on a small number of problem gamblers, and a 3 – 10% impact on club revenue. In contrast, a 3 hour shutdown of EGMs in New South Wales (NSW) in 2002 was deemed to be an ineffective harm minimization strategy (ACNielsen & ACGR, 2003). However, this may have been partly due to the fact that some of the NSW clubs varied the time of their shutdown hours, and that the Sydney Star City casino was exempt from the shutdown (McMillen & Pitt, 2005). The province of Nova Scotia shut-down of EGMs in locations outside of casinos at midnight, which resulted in a self-reported 18% reduction in spending among a random sample of problem gamblers, and a decrease in overall revenue of between 5.1 - 8.7% (Nova Scotia Gaming Corporation, 2005).

Reduced hours of operation continue to make theoretical sense considering a) the general premise that reduced availability leads to reduced problems, and b) evidence in the alcohol field that restricted hours and days of operation reduce social harm (Babor, Caetano, Casswell, et al., 2010; Chikritzhs & Stockwell, 2006; Stockwell & Chikritzhs, 2009). However, as with reductions in the number of EGMs, *unless availability reductions are meaningful and substantial, it seems unlikely that a significant overall beneficial impact will be attained.*

## RESTRICTIONS ON WHO CAN GAMBLE

### Prohibition of Youth Gambling

Worldwide, it is a common policy to restrict gambling to individuals who are of legal adult age (Rose, 2001), which ranges from 15 – 21, depending on the country (18 being most common)<sup>19</sup>. There are some important regional variations on this policy. For example, there is currently no age restriction for purchasing lottery and instant win tickets in Poland (Dzik, 2009). There are no age restrictions for non-casino gambling in Slovenia (Macur, Makarovic, & Roncevic, 2009). There are no age limits to play electronic gambling machines ('fruit machines') with low prize limits in the United Kingdom. Prior to 2004, slot machines outside casinos in Finland could be played by any child or adolescent if accompanied by an adult (current age required is 16, raised to 18 in July 2011) (Jaakkola, 2009). Sixteen year olds can purchase lottery tickets in England and Finland (raised to 18 in October 2010). Historically, in Estonia, there was no age limit on purchasing lottery tickets (16 was made the minimum age in 2010) (Laansoo & Niit, 2009). Prior to 2007 lottery tickets could be purchased by youth in Israel (Gavriel-Fried & Derevensky, 2009). A few U.S. states (and Alberta, Canada) permit bingo playing at age 16. Citizens of Malta have to be 25 to enter a Maltese casino.

Some countries lack specific laws prohibiting youth gambling and, where laws exist, there is also wide variation regarding enforcement. In general, enforcement tends to be more rigorous where gambling occurs in adult-only venues (e.g., casinos, bars/clubs/lounges) and less so where gambling is available in public locations. Consequently, North American and Australian youth tend to have low rates of casino table game and gambling machine play as they are only available in adult venues, but high rates of lottery and scratch ticket play which is available in public locations (Delfabbro, Lahn, & Grabosky, 2005; Felsher, Derevensky, & Gupta, 2004; Jacobs, 2004). In contrast, gambling machine play is among the most common gambling activity among youth in Nordic countries, as these machines have historically been located in public locations (Johansson & Gotestam, 2003; Olason, Sigurdardottir, & Smari, 2006).

Between jurisdiction comparisons of gambling and problem gambling in youth and definitive prevalence rates are difficult to establish because of the range of instruments (i.e., SOGS, SOGS-RA, DSM-IV, DSM-IV-MR-J), as well as serious concerns about whether these instruments overestimate true prevalence rates (e.g., Ladouceur, Bouchard, Rheaume, et al., 2000; Pelletier, Ladouceur, Fortin, & Ferland, 2004; Tremblay et al., 2010). Nonetheless, some interesting observations can be made about obtained rates. First, despite prohibition, the past year prevalence of youth problem gambling, which ranges from 2% to 6%, appears to be at least as high, if not higher than adult rates (Rossen, 2001; Shaffer & Hall, 2001, Williams, Volberg, & Stevens, 2012). Second, no obvious differences in youth prevalence rates appear to exist between jurisdictions, despite significant variations in availability and enforcement (Rossen,

---

<sup>19</sup> Wikipedia (2012). [Age of Majority](#).

2001; Shaffer & Hall, 2001). Finally, and somewhat surprisingly, countries where youth have greater access to gambling (e.g., the U.K. and Nordic countries) tend to have somewhat lower rates of *adult* problem gambling (Williams, Volberg, & Stevens, 2012).

Hence, it is also worth considering whether early exposure to gambling could have beneficial effects on the level or intensity of subsequent adult gambling. The analogy here is the oft cited lower rate of adult alcoholism in many countries where children are exposed to alcohol at an early age (e.g., China, Israel, southern European countries such as Italy) (Heath, 1995; Pittman & White, 1991). However, it is important to recognize that in many cases early exposure is known to be quite harmful. For example, indigenous groups (e.g., North American Aboriginals, Australian Aborigines) and certain countries such as France have very high rates of alcohol dependence despite early exposure. Furthermore, an early onset of substance use (e.g., Taioli & Wynder, 1991; Dawson et al., 2008) and gambling (Gupta & Derevensky, 1998; Kessler et al., 2008) tends to be a strong correlate of problems later in life.<sup>20</sup> Finally, animal research (with much better experimental controls on the relevant variables) has found that adolescent exposure to drugs (e.g., nicotine, alcohol) creates permanent neurochemical changes that results in increased adult consumption of these products with this effect much more pronounced for strains of addiction-prone animals (Diaz-Granados & Graham, 2007; Levin et al., 2003; Rodd-Henricks et al., 2002; Schramm-Sapyta et al, 2008; cf. Slawecki & Betancourt, 2001).

What is common among cultures with low rates of alcoholism despite early exposure *is ongoing promotion and modelling of moderate use in the context of family, meals, and/or religious service, as well as cultural taboos against drunkenness* (Heath, 1995; Pittman & White, 1991). Thus, it is likely that *extended modelling during initial use of the product* is the important ingredient. This mechanism is also thought to account for the reduced rate of traffic accidents in jurisdictions that have introduced graduated driver licensing (e.g., McKnight & Peck, 2003). Hence, the evidence would suggest that deliberately exposing youth to gambling at a young age is probably counterproductive. However, modelling responsible gambling to youth prior to their unrestricted ability to gamble on their own would likely have value, as would a graduated ability to gamble independently. A mandatory educational session(s) for all first time gamblers might also have utility.

### Increasing the Legal Age for Gambling

It is also worth considering the utility of **raising** the legal age for gambling. Currently, the legal age varies from 16 – 25 depending on the type of gambling and the specific jurisdiction. There is very little empirical evidence that establishes the potential effectiveness of applying this approach to gambling. Norway raised its legal age to 18 from 16 and found a coincident decrease in slot machine use (Gotestam & Johansson, 2009). However, considerable evidence of the effectiveness of similar policy measures exists in the alcohol field. For example, lowering the age limit for alcohol consumption (as occurred in the 1970s in North America) resulted in a

---

<sup>20</sup> This observation has resulted in the development of preventive programs that endeavour to delay the onset of experimentation.

significant increase in alcohol-related harm (Babor, Caetano, Casswell, et al., 2010). Similarly, a comprehensive review of all studies published on the legal drinking age between 1960 and 2000 concluded that increasing the legal age for purchase and consumption of alcohol from 18 to 21 was more effective than any other policy for reducing alcohol-related harm (e.g., fatal alcohol related motor-vehicle accidents, heavy alcohol consumption) among students and young adults (Wagenaar & Toomey, 2002) (see also Keller, Frye, Bauerle, & Turner (2009) and Fell et al. (2008)). Moreover, the jurisdiction-specific magnitude of the impact was found to be directly related to the degree to which the change in the legal drinking age was legally enforced (Babor, Caetano, Casswell, et al., 2010).

### Restricting Venue Entry to Non-Residents

Some countries do not permit local residents to gamble at casinos. Historically, this was not uncommon in European countries (e.g., France; Slovenia till 1990; Germany from 1938 – 1995<sup>21</sup>, Meyer, Hayer, & Griffiths, 2009). Current examples include the Bahamas, Malaysia, Papua New Guinea, Vietnam, and Nepal. Australia does not permit residents to gamble at any Australian-based online casino although it did permit its citizens to wager money with Australian online sports and race books, poker rooms, lottery sites, and skill game sites.

In other countries, resident access is severely restricted. Currently, in Slovenia, HIT Casinos only permit residents from the local region to gamble at their venues 4 times a month (Macur et al., 2009). South Korean citizens are only allowed to gamble at one of South Korea's 16 casinos. The rationale for this policy is the same as the rationale for locating casinos in tourist areas: to ensure that casino revenues come from outside the jurisdiction and to protect the local populace from harm.

Although theoretically sound, there is a lack of empirical evidence on the effectiveness of this policy in preventing problem gambling amongst the citizenry. It is clear that gambling remains commonplace in some countries where this policy exists. Nonetheless, casino gambling is uncommon in South Korea, with only 1.5% of the adult population engaging in this in 2011 (Williams, Lee, & Back, in press), and rates of problem gambling (0.8%) are significantly lower than other Asian jurisdictions (Singapore, Hong Kong, Macau) (Williams, Volberg & Stevens, 2012). Another important observation is that despite the restrictions on legal gambling availability, only 0.1% of South Koreans report illegally gambling at a domestic casino, only 0.6% report gambling at foreign casinos, and only 0.7% report online gambling at an offshore site (Williams, Lee, & Back, in press).

---

<sup>21</sup> Local residents in this case meant people from the particular city where the casino was located.

## Restricting Venue Entry to Higher Socioeconomic Classes

Dress codes requiring formal attire exist in some European countries (e.g., France, Germany, Holland), partly to maintain the sophisticated ambience, and partly to cater to higher socioeconomic classes. Significant entry fees are required in some countries (e.g., Papua New Guinea), which are intended to have the same effect. In Singapore, the 2010 Casino Control Act bans casino entry to anyone who has claimed bankruptcy or receives social assistance and residents are required to pay a \$100 admission fee or \$2,000 for an annual pass. The German state of North Rhine-Westphalia recently banned the unemployed from betting on sporting events (RTE News, 2011).

Low socioeconomic status is a strong predictor of problem gambling status in most countries (Williams, Volberg, & Stevens, 2012). (Surprisingly, Singapore is one of the few countries where *middle and high income* has a stronger association with problem gambling (Singapore Ministry of Community Development, Youth and Sports, 2005, 2008)). Hence, this policy and associated measures to limit or otherwise contain gambling expenditures among lower economic groups may have some utility in preventing the harm associated with problem gambling.

## Casino Self-Exclusion <sup>22</sup>

Informal casino self-exclusion programs have been used by various casinos around the world since at least the 1960s. The first formal casino self-exclusion program was initiated in 1989 in Manitoba, Canada, coincident with the opening of the country's first permanent, year-round casino (Nowatzki & Williams, 2002). In the Netherlands, Holland Casino developed a program in 1990. In the United States, a tribal casino in Connecticut implemented a self-exclusion program in 1994, and Missouri developed the first state-wide program in 1996. Since that time, many casinos and jurisdictions around the world have adopted self-exclusion programs (Nowatzki & Williams, 2002; Responsible Gambling Council, 2008). In Europe this includes Austria, Belgium, Bulgaria, France, Malta, the Netherlands, Portugal, Slovenia, and the United Kingdom). In addition, several Internet gambling sites also offer self-exclusion programs (Griffiths, 2012; Wood & Williams, 2007a; 2009).

The effectiveness of self-exclusion programs can be measured in three ways. The first is the utilization rate for the program. On the basis of self-exclusion data for 7 Canadian provinces with casinos (as provided by regulatory agency staff to one of the authors (BW) in 2005), between 0.6% and 7.0% of problem gamblers signed up to self-exclude, depending on the province. Similar low utilization rates have been reported in Australia and the United States

---

<sup>22</sup> In some jurisdictions, 'casino' self-exclusion also includes other gambling venues such as racetracks with slot machines and/or bingo halls. Some jurisdictions also allow lottery self-exclusion (e.g., Iowa since 2005). Casino self-exclusion is primarily a 'tertiary' prevention initiative in that it occurs after problems have developed, and would not normally be covered in this review. However, it has been included because a) it is used as a preventive measure by some nonproblem gamblers; and b) it can be included on a continuum with some of the on-site interventions used for at-risk gamblers (described later).

(South Australian Centre for Economic Studies, 2003). One European jurisdiction with significantly higher rates is the Netherlands. This is due to the proactive nature of their program, where individuals with high rates of casino patronage are proactively approached to see whether they wish a 'visit limitation' or casino exclusion contract (Bes, 2002; De Bruin et al., 2001; Nowatzki & Williams, 2002; Goudriaan, de Bruin, & Koeter, 2009). Thus, "offering" appears to be more effective than "making available".

Other measures to determine the effectiveness of self-exclusion programs include a) the percentage of self-excluded people who do not actually re-enter the casino(s) during the contracted period of exclusion, and b) the impact self-exclusion has on overall gambling behaviour. Several studies have investigated these issues (see Gainsbury, 2010 for a review):

- Ladouceur, Jacques, Giroux, et al. (2000) studied 220 individuals who self-excluded from a Quebec casino (that had no penalty for breaches). A subset of 53 went back to renew or re-establish a self-exclusion contract. Of this group, 64% reported they had not entered the casino during their previous exclusion period. However, the 36% who did return reported going back a median of 6 times. Only 30% of these 53 people reported they had stopped gambling completely during their previous contract (which had typically been for a period of 6 to 12 months) (Ladouceur, Jacques, Giroux, et al., 2000).
- Steinberg and Velardo (2002) studied a small subset ( $n = 20$ ) of the 294 self-excluders at the Mohegan Sun Casino in Connecticut. Eighty percent reported they did not return to the casino during the period of exclusion, but the majority of the 20% that did return went back more than 9 times.
- A review of self-exclusion in Victoria, Australia also concluded that a significant number of self-excluders re-enter casinos without being detected (O'Neil et al., 2003).
- A survey of 135 self-excluders from New South Wales by Croucher, Croucher & Leslie (2006) reported that 70% of participants reduced their gambling expenditure by 50%. However, 75% started gambling within 6 months of self-excluding, and 67% of those who breached their agreements indicated they were detected.
- A total of 169/239 Quebec first time self-excluders agreed to be contacted every 6 months by Ladouceur, Sylvain, & Gosselin (2007). Participants were divided into the length of exclusion they chose: 6 months, 12 months, or 24 months. Retention was low, falling to 116 at 6 months, 83 at 12 months, 60 at 18 months, and 53 at 24 months<sup>23</sup>. Follow-up evaluations found self-excluders to have significant reductions in the urge to gamble and problem gambling symptomatology. At the 6-month follow-up, 40.5%, 42.3%, and 22.2% of the self-excluded patrons had re-entered a casino (6, 12, and 24 month groups respectively). At the 12 month follow-up 55.3% and 10.5% of the 12 and 24 month groups had breached. Finally, at the 18 month follow-up, 26.6% of the 24 month group had breached.
- An Alberta Gaming and Liquor Commission (2007) study contacted a random sample of 300 Alberta self-excluders who had previously been in or were currently in the self-exclusion

---

<sup>23</sup> With such attrition rates, results must be accepted with caution as it would be reasonable to anticipate that dropping out is more likely to occur because of breaching the self-exclusion contract.

program.<sup>24</sup> The majority of people were satisfied with the program with 67% reporting it was somewhat or very effective in doing what they expected it to do. However, 47% spontaneously indicated that the main weakness of the program was lack of enforcement. A total of 50% reported having re-entered during the time of their contract, breaching 33 times on average. Only 48% indicated that they had ever been detected, with the ones never being detected entering an average of 51 times, but the ones who had been detected only entering 13 times.

- A nonrepresentative sample of 76 self-excluders from 7 Canadian provinces was surveyed by the Responsible Gambling Council (2008). Participants reported their gambling was reduced following self-exclusion and 30% did not gamble at all during the contracted period. Nonetheless, 59% gambled at venues not covered by their agreement. Another 33% breached their agreements (70% of these breaches were undetected).
- Hayer & Meyer (2011a,2011b) contacted banned gamblers from 18 different casinos in Austria, Germany, and Switzerland (baseline sample = 152). Follow-up surveys at 1, 6, and 12 months found significant decreases in gambling. However, the participants who were actually followed up constituted a very small (presumably nonrepresentative) percentage of the total group.
- Fifty percent of problem gamblers who had banned themselves from Holland Casinos reported they had gambled elsewhere during the period of the ban (e.g., illegal casinos, arcades, or abroad) (Goudriaan et al., 2009).
- Nelson et al. (2010) surveyed 113 Missouri self-excluders (from 419 selected to be interviewed) 4 to 10 years after receiving lifetime bans. Although only 13% had not gambled at all since their ban, the large majority reported gambling less than before the ban. Among these, there was a notable reduction in symptoms of problem gambling. Seventy four percent of people who continued to gamble went to casinos in other jurisdictions. Only 16% attempted to re-enter a Missouri casino, with 50% being successful, some re-entering a large number of times. Self-excluders who engaged in complementary treatment had more positive outcomes than those that did not.
- In British Columbia, 169 self-excluders (roughly 6% of eligible self-excluders) participated in the baseline longitudinal evaluation of the self-exclusion program. The sample decreased to 43 individuals by the fourth assessment 2 years later (BC Centre for Social Responsibility, 2011). The majority of individuals continued to gamble after exclusion, however, only 35% reported re-entering a British Columbia casino during the period of exclusion. The majority of these individuals re-entered without being detected, often multiple times. There was rarely any penalty imposed for those who were detected.

Casino self-exclusion programs have lower potential to reduce harm compared to other initiatives, as they are designed to minimize the harm in existing problem gamblers rather than preventing problem gambling in the first place. However, it is clear they have some value as a

---

<sup>24</sup> The Alberta self-exclusion program had been in operation for 6 years at the time of the study. Ban length was 6 months, 1 year, 2 years, or 3 years. 15% of the sample enrolled in 2006; 21% in 2005; 20% in 2004; 20% in 2003; 8% in 2002; 11% prior to 2002; 5% didn't report when they enrolled. In Alberta, the penalty for breach is the possibility of up to a \$10,000 fine and up to 6 months imprisonment (however, enforcement is uneven).



tertiary initiative. The most unambiguous impact is that most people who enter into these programs have a significant reduction in their gambling and problem gambling symptomatology. Undoubtedly, a good portion of this effect is due to the fact that people taking this step have recognized they have a problem, are highly motivated to do something about it, and have made a public proclamation that they do not intend to reenter casinos. The subsequent behavioural changes observed in self-excluders are not fundamentally different than what is observed in people presenting themselves to any form of gambling treatment. The additional utility of self-exclusion lies in its potential to provide additional external constraints on the person's gambling when his/her motivation falters. This, in turn, is related to the following factors (Nowatzki and Williams, 2002):

1. *Whether the bans are irrevocable.* Revocable bans (which are common) defeat the purpose of self-exclusion, which is to set up enduring external constraints for people attempting to curb their gambling, usually after efforts at self-control have failed. Irrevocability helps manage periods of internal conflict, where the urge to gambling predictably becomes high. Evidence also indicates that patrons prefer irrevocable bans.
2. *Whether longer ban lengths are available.* Many jurisdictions only have short ban lengths (e.g., 6 months to 2 years), which sends the wrong message to self-excluders, the majority of whom will have lifelong propensities for excessive gambling. The appropriate or optimal length of abstinence required to prevent problem gambling relapse is unclear. However, for substance abuse, abstinence of 3 to 6 months is commonly achieved but has almost no predictive value in preventing relapse. Rather, periods greater than 2 years are necessary to prevent relapse in most cases. Even then, 25% of alcohol-dependent people will relapse after four years of abstinence and 7% will still relapse after 6 years (Vaillant, 1995). Hence, from a clinical perspective, it would be prudent to encourage ban duration of at least 5 years and to have a lifetime option available. However, a short ban length of 6 months should also be available to encourage the use of self-exclusion in people uncertain whether they wish a long term ban.
3. *How widely applicable the ban is.* Self-exclusion has limited deterrent value if it is only applies to one venue or one type of gambling. Jurisdiction-wide exclusion is common in Canada (except Quebec) and Europe (although sometimes limited to casinos), but is less common in the United States and Australia. In Canada, self-exclusion also applies to racinos and bingo halls in some provinces. Only a few countries apply land-based self-exclusion to their online gambling services (and vice versa). The ability of the self-excluder to readily access gambling in neighbouring jurisdictions is also related to the net deterrent value of self-exclusion.
4. *The perceived and actual chances of casino reentry being detected.* Most Western countries have always required some form of identification to enter a casino.<sup>25</sup> This includes Australia (clubs only), Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland,

---

<sup>25</sup> The ID required is usually some form of government-issued photo ID (e.g., passport, driver's license). A few jurisdictions have used casino-issued non-photo ID (e.g., Missouri), which has less utility, as it is much more likely to be given away or loaned. Of note, when Missouri ended their ID requirement in 2008 an 18% decrease in the number of detected self-excluders occurred in the first half of 2009 (Young, 2009).

France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Malta, Macedonia, Moldova, Monaco, Netherlands, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom (clubs only). Requiring ID to enter a casino is also common in most Asian, South American, and African casinos. Automated scanning of ID against a self-exclusion list provides much more effective detection than a system that requires casino security staff to visually recognize a self-excluded individual. Visual detection is currently used in Canada, the United States, Australia, New Zealand, and a few other countries.<sup>26</sup> Computerized identification checks further enable more proactive 'visit limitation contracts', as opposed to total bans, as occurs in the Netherlands (Bes, 2002) (see section on Intervention for 'At Risk' Gamblers). In some countries that rely primarily on staff recognition of self-excluders, supplementary detection systems have been implemented that have modestly improved these low detection rates (i.e., detecting self-excluders through their Player Card usage, biometric facial recognition, license plate recognition, paying staff to detect self-excluders)<sup>27</sup>.

5. *The consequences of detection.* Even though penalties to the gambler are often stipulated in self-exclusion agreements (e.g., fines, confiscation of winnings, trespassing charges), with the exception of forfeiture of winnings, they are rarely applied (Nowatzki & Williams, 2002). Mandatory identification for wins over a few hundred dollars combined with automatic confiscation of winnings for barred self-excluders would eliminate much of the incentive to violate bans.

---

<sup>26</sup> The difficulty of this task is illustrated by the fact that in 2007 over 10,000 people were self-excluded in the province of Ontario, and reference files for security staff filled 22 binders (Canadian Broadcasting Corporation, 2007). Schrans, Schellinck & Grace (2004) found in a Nova Scotia evaluation, that of 150 people posing as self-excluders (i.e., they had formally registered in order to test the effectiveness of detection), 77% of breaches were not detected. Although North American casino owners often contend that patrons would not accept an ID requirement, showing ID is a common practice in many contexts, such as cashing a cheque, boarding a plane, etc. Furthermore, since 2003 many bars throughout Canada and the United States have been using an ID scanning system to exclude undesirable patrons (<http://www.entersafe.com/>) (formerly known as Barwatch and Barlink).

<sup>27</sup> Illinois casinos pay employees \$250 for every self-excluded gambler they detect (Illinois Gaming Board, 2008). Facial recognition was introduced by some North American casinos in the late 1990s for identification of card counters, cheats, and 'high rollers' (Market Wire, 2000). In subsequent years it was adopted by many casinos around the world (e.g., U.S., Canada, Macau, Germany, and Australia) in an effort to also identify self-excluders. Historically, facial recognition biometrics has been beset with technical problems, making its utility quite limited (EPIC, 2005; Woodward, Horn, Gatune, Thomas, 2003; Zhao, Chellappa, Phillips, Rosenfeld, 2003). The main problem is that maximum effectiveness requires a full frontal screen of the person's face under good lighting (e.g., locating cameras at a brightly lit entrances). The more typical use of overhead video cameras does not provide adequate facial capture, and thus, yields many 'false negatives' (i.e., people not successfully detected) and some 'false positives' (people incorrectly identified as self-excluders). In June 2009, British Columbia abandoned facial recognition because of continuing poor results and replaced it with 'license plate identification' (beginning in 2008), whereby self-excluders provide their vehicle license number which is then detected by parking lot cameras at casinos (1/3 of detections are now due to this). Improvements in facial recognition continue, however (Moore, 2007; Williams, 2007), and casinos employing the most recent technology in combination with entrance cameras report good results (e.g., Zielke & Wolfer, 2008). One of the most advanced systems is used in Ontario, but a April 2009 evaluation report (obtained by Freedom of Information legislation by the authors) of the iGWatch Face Recognition System shows it to have a correct identification rate of only 15%, a false rejection rate of 85% (i.e., failed to detect a self-excluder), and a false acceptance rate of 2% (i.e., misidentified someone as a self-excluder).

6. *The consequences of failing to detect.* Gambling venues rarely suffer consequences for failing to exclude people they indicated they would.<sup>28</sup> Indeed, most gambling venues consider themselves absolved of legal responsibility when a self-exclusion contract is breached. Their perspective is that these are ‘agreements’, rather than legally binding ‘contracts’ (many have also introduced clauses that stipulate they are absolved from responsibility should breaches occur). To date, courts in the United States, Australia, and the United Kingdom (Armstrong, 2008) have agreed with this position. However, in 2003 the Appeals Court of Austria ruled against Casino Austria, stating that the casino had an obligation to refuse entry to players whose financial solvency was in question (Rhea, 2005). At least three cases in Germany have been settled in favour of the self-excluder (Glücksspiel & Recht, 2009). In 2007, German law unambiguously established a legal requirement for all casinos to take ‘reasonable efforts’ to ensure that casino patrons are not self-excluded gamblers, who may be reimbursed for their losses if casinos fail to meet this duty (Gambling Compliance Ltd, 2007; Meyer & Hayer, 2009). Since 2000, Swiss law has required casinos to detect gamblers ‘at risk of addiction’ and to then take appropriate action (Hafeli, 2009). The Ontario Lottery and Gaming Corporation have settled 13 self-exclusion cases out of court in recent years in favour of the patron (Canadian Broadcast Corporation, 2007; Rhea, 2005). Many observers believe it is only a matter of time before the legal ‘duty of care’ established for alcohol providers (e.g., U.S. Dram Shop liability laws; Canadian Supreme Court 1973 Menow ruling) is applied under common law to gambling providers (Hillyer, 2003, as cited in Sasso & Kalajdzic, 2006).
7. *The availability of complementary treatment.* Problem gamblers who sign exclusion contracts have taken an important step, but many would further benefit from a formal treatment program (Sani, Carlevaro, & Ladouceur, 2005). Accordingly, treatment options should be offered and encouraged to everyone who enters into a self-exclusion contract. The province of Manitoba has long required self-excluded patrons to attend a responsible gambling awareness seminar prior to re-entry (topics include: review of past gambling history, information on how gambling works, plan for returning to gamble). Quebec is using a similar approach and Alberta instituted its own system in July 2009 (Responsible Gambling Council, 2008). In Illinois, the self-excluded person must receive certification from a psychiatrist that controlled gambling is possible before casino entry is re-instated.

---

<sup>28</sup> Exceptions to this rule exist. The Iowa Racing and Gaming Commission fines casinos \$20,000 - \$30,000 each time they admit customers who have self-excluded (Gearino, 2008). Singaporean casinos can be fined up to \$1 million and lose their license (Brunei Fm World News, 2009).

## **RESTRICTIONS OR ALTERATIONS ON HOW GAMBLING IS PROVIDED**

### **Modifying Electronic Gambling Machine (EGM) Parameters**

In recognition that EGMs are currently associated with the highest problem rates in Western countries, a number of research studies have investigated initiatives to alter machine features in attempts to mitigate harm. In most gambling locales, machines with the highest revenue generation continually replace less lucrative machines. Hence it can be expected that contemporary machines have evolved to employ a wide array of attributes that maximize revenue generation. Following is a summary of research that has endeavored to 'unravel' some of the feature modifications intended to minimize EGM harm. Reviews of this issue are also contained in Parke & Griffiths (2007), Griffiths (2008), and Livingstone & Woolley (2008).

### **Win/Loss Patterns**

In one of the first laboratory studies of gambling, Lewis and Duncan (1956, 1957, 1958) found that a lower percentage of wins during the trial period produced longer periods of persistent EGM play after the machines no longer delivered wins. Lewis and Duncan (1957) also found that the larger the size of the wins, the longer it took to extinguish play.

Levitz (1971) exposed university students to an EGM variable ratio schedule that either produced a net win or a net loss over 22 trials. Both groups were then subjected to a net loss schedule. Participants with the prior exposure to the net win schedule persisted significantly longer in the second phase.

Dickerson, Hinchy, England, Fabre, and Cunningham (1992) observed the natural play of 10 high frequency EGM gamblers and found that small wins (fewer than 50 credits) were associated with an increase in play rate, but big wins (more than 50 credits) caused a temporary decrease in play rates (termed 'post-reinforcement pauses'). Similar results in similar naturalistic studies were reported by Dickerson (1993), as well as findings that the number of big wins during the session was strongly predictive of duration of the session. Delfabbro and Winefield (1999a), also using a naturalistic observational study, obtained the same findings regarding the effects of small versus big wins on play rates immediately following wins, but did not find win size made a difference in overall rate of play. A post-reinforcement pause in laboratory EGM play following wins was also found by Schreiber and Dixon (2001) and Dixon and Schreiber (2002). In addition, the latter study found that the speed of play increased as the number of non-reinforced trials (i.e., without wins) increased. In contrast to Dickerson (1993), Kassinove and Schare (2001) did not find that a 'big' win in a laboratory setting resulted in greater persistence to extinction, although they suggest the size of the big win (\$10), may have been insufficient for the anticipated effect. Similarly, Weatherly, Sauter & King (2004) found that laboratory participants who experienced a big win on their first play quit playing the simulation earlier

than participants who experienced a large win on the 5<sup>th</sup> play. Dixon, MacLin, & Daugherty (2006) found that participants had a preference for slot machines with more frequent payouts compared to ones with more intermittent payouts.

### Game Play Speed

The speed at which play is permitted is also a reinforcement parameter, as it directly relates to frequency of rewards. Accordingly, some countries mandate a minimum time gap between games (e.g., 3 seconds in casino-based EGMs in Belgium, Druine, 2009; 5 seconds in Spain, Becona, 2009; 3.5 seconds in South Australia, 2.1 seconds in Victoria, and 3 seconds in Tasmania and Queensland; Australian DFHCSIA, 2012).

Blaszczynski, Sharpe, and Walker (2001) found no significant difference in money or time spent between individuals who played EGMs with 3.5 second versus 5 second game speeds in a study conducted with 210 EGM players in clubs and hotels in New South Wales. This finding was attributed to the fact that only 12% of players normally played at a wager cycle faster than 5 seconds. Delfabbro, Falzon, & Ingram (2005) found that 3.5 second games (relative to slower games) *did* produce an increase in *number of games played*, but not *total time* spent playing. Results of a study conducted by Ladouceur & Sevigny (2006) indicated that 5 second game speeds caused gamblers to play significantly more games and spend more money compared to 15 second game speed EGMs. Similarly, a 30% reduction in game speed was reported to be an important factor in a 14% reduction in expenditure and time spent by gamblers (particularly higher risk gamblers) in a study of VLTs in Nova Scotia (Corporate Research Associates, 2006).<sup>29</sup>

The introduction of auto-play EGMs (machines that play automatically on insertion of money and pressings of an 'AutoPlay' button), is relevant to the issue of game speed play, but there has been no research on their impact. Nonetheless, the presumption of greater harm is reflected in the fact that AutoPlay has been banned in Victoria, South Australia, and Western Australia (Caraniche Pty Ltd., 2005).

### Near Misses

Most EGMs are programmed to display 'near misses' (or 'near wins') more frequently than they would occur by chance occurrence despite some legal efforts to ban this feature (Harrigan, 2008).<sup>30</sup> The importance of 'near misses' in EGM gambling to perpetuate play has been

---

<sup>29</sup> The actual time speeds used were not reported.

<sup>30</sup> In Ontario, for example, the Alcohol and Gaming Commission of Ontario (AGCO), in their Minimum Technical Standards for Electronic Gaming Equipment (Dec 2007) states that regarding 'Near Misses', that "after the selection of game outcome, the gaming equipment must not make a variable secondary decision which affects the result shown to the player. For instance, the Random Number Generator (RNG) chooses an outcome that the game will lose. The game must not substitute a particular type of loss to show to the player. Lotteries have similar features, as the most common lottery format worldwide involves selecting between 5 and 7 numbers between 1

recognized for some time (Reid, 1986; Griffiths, 1991; Harrigan, 2009). For example, Strickland and Grote (1967) found that placing frequent winning symbols early in the slot machine's 3 symbol sequences increased persistence in laboratory slot machine play compared to when they were placed late in the sequence. Skaer (1985) similarly found that his subjects preferred to play the slot machine that was perceived to come close to paying off more frequently. This same finding was obtained by MacLin, Dixon, Daugherty, & Small (2007). Both Kassinove and Schare (2001) and Cote, Caron, Aubert, Desrochers, and Ladouceur (2003) have confirmed that people who come close to a 'near win' persist significantly longer in subsequent laboratory EGM play. Wohl and Enzle (2003) found that wagers following a near loss were significantly higher in subsequent games of laboratory-based, computerized roulette play.<sup>31</sup> Clark et al. (2009) has further documented that near misses enhance motivation to gamble. Giroux & Ladouceur (2006) found that more gamblers chose to continue their gambling session of VLTs showing near wins. However, this preference did not translate into more money spent on that VLT.

### Number of Play Lines

In recent years there has been a tendency to increase the number of play lines available on EGMs, which has the effect of increasing the overall rate of operant reinforcement (Haw, 2008a; 2009; Harrigan et al., 2011). Not surprisingly, then, in a series of observational studies, Williamson & Walker (2000) and Walker (2001) have found that gamblers have a preference for playing large number of lines (up to 20), with a minimum bet per line. This is known as the 'mini-max' strategy (Livingstone et al., 2008). In a laboratory investigation, Delfabbro, Falzon and Ingram (2005) also found that 3 line betting produced an increase in the number of games played and time spent compared to single line betting.

Very few jurisdictions impose constraints on play lines. An exception is Australia, where no more than 50 lines are permissible in Queensland and no more than 30 in Tasmania (Australian DFHCSIA, 2012).

### Bill Acceptors

Note or bill acceptors were introduced EGMs beginning in the late 1980s and early 1990s primarily to decrease the need to handle large amounts of change (both for the gambler and the venue). However, an added consequence was a significant increase in EGM revenues. It is thought that these increased revenues may have disproportionately impacted problem gamblers, as note acceptors decrease the need to visit the cashier on a regular basis (which might act as a social or psychological constraint) and decrease the need for breaks (Productivity

---

and 60. As a result, many players have correctly selected a significant portion of the winning numbers (and receive small prizes), and will believe they were close to winning the jackpot when they were not.

<sup>31</sup> A related phenomenon likely with the same effects, is 'nudging', where an EGM reel appears to come to a halt with a winning sequence, and then a second or two later, nudges over to a different outcome.

Commission, 1999). Note acceptors are now common on EGMs, but are prohibited in some jurisdictions (e.g., Norway; South Australia; within hotels and clubs in Tasmania and the Australian Northern Territory (Australian DFHCSIA, 2012)). Other jurisdictions limit the size of bill the note acceptor will take (e.g., \$100 note acceptors are banned in the Australian Capital Territory and Victoria (Australian DFHCSIA, 2012)).

There is limited formal research on the impact of bill acceptors. In 2006 the Norwegian government banned them on EGMs, following which a 16% drop occurred in the number of calls to the national problem gambling helpline and a 24% reduction in the number of people seeking help for gambling problems (Engebø & Gyllstrøm, 2008; Gotestam & Johansson, 2009). In adolescents (age 13 -19), there was 20% reduction in both slot machine use and the proportion of problem gamblers (Hansen & Rosow, 2009). Limiting the size of the note, on the other hand, has not proven very effective. Blaszczynski, Sharpe, and Walker (2001) (also reported in Sharpe et al., 2005) found that limiting bill size to a \$20 AU maximum had no significant effect on time or money spent gambling (even though more problem gamblers than recreational gamblers used large note acceptors). They attributed this to the fact that all venues have facilities to change larger denominations to smaller notes. This same restriction was reported to be ineffective in a study of Queensland EGM players (Brodie, Honeyfield, & Whitehead, 2003), a significant portion of whom indicated the maximum note amount should be lower than \$20 or that bill acceptors should be eliminated altogether.

### Stake and Prize Size

There is a presumption in many European countries that EGMs allowing larger bets and offering larger jackpots may be more problematic. This is reflected in the fact that it is common to have different 'classes' of EGMs, with greater restrictions on the numbers and placement of machines that allow larger stakes and prizes (Meyer, Hayer, & Griffiths, 2009). In Belgium, wins at casino EGMs are allowed to reach €70 per hour, whereas arcade EGMs are limited to €25/hr and bingo machines €12.5/hr. Also, the maximum jackpot is €10,000 for casino EGMs, €2,000 for arcade EGMs and €500 for bingo machines. In Germany, EGMs in arcades, restaurants and bars are required to have lower stakes and jackpots than in casinos. In Great Britain, EGMs are categorized according to the maximum stake and prize available, with the maximum stake ranging from 10p (D category machines) to £100 (B2 category machines) and the maximum prize ranging from £8 (D) to £4000 (B1). Machines with the highest stake and prizes are limited to casinos and betting shops/tracks, with lower stake/prize machines being permitted in pubs, and arcades. In Hungary, category 2 machines in pubs and restaurants have a maximum stake of €0.8 and a win not more than 25 times the stake, and category 1 machines in gaming arcades and casinos permit a win of 200 times the stake. In Iceland, the maximum prize is €110 in shops and food outlets without a liquor license, but €1100 in bars and restaurants with a liquor license. In Lithuania, machines with unlimited payouts can only be operated in casinos, but machines with limited payouts can be operated in gambling machine halls. In the Netherlands, the loss on EGMs outside casinos is limited to €40 per hour but is unlimited for EGMs inside casinos. In Poland, EGMs outside casinos and arcades are limited to €0.07 per bet with the maximum prize being €15. In Australia, there is a \$5 bet limit in Tasmania, Victoria, Queensland

(hotels and clubs), and a \$10 limit in other states/territories (Australian DFHCSIA, 2012). Certain states have no win limit (Australian Capital Territory, Northern Territory, South Australia, Tasmania, Victoria, Western Australia), whereas others have limited it to \$10,000 for non-linked machines (South Australia, Queensland, New South Wales).

Relatively little formal research has been conducted on this issue. In Australia, the top revenue-generating EGMs tend to have a higher average bet size, which is due to having a larger number of play lines to bet on (Livingstone & Woolley, 2008). In laboratory settings, Weatherly and Brandt (2004) found that students tended to bet more when given \$1 and each bet was worth \$0.01, compared to students who were given \$10 and each bet was worth \$0.10, suggesting that the perceived magnitude of bets and losses influences duration of play. In contrast, Delfabbro, Falzon, and Ingram (2005) found no influence of bet size (1 versus 3 credits) on time spent gambling or number of plays.

However, it is perhaps worth noting that the lower rates of problem gambling found in many European countries (Williams, Volberg, & Stevens, 2012) is associated with significantly lower bet and win sizes on most European EGMs. For example, in 1998 the maximum bet in the U.K. was only £0.50, whereas it was \$10 in Australia, \$100 in Canada, and \$500 in the U.S (Caraniche Pty Ltd., 2005). Although higher stakes EGMs have been introduced in most European countries in recent years, lower stake EGMs are still common (Meyer, Hayer, & Griffiths, 2009).<sup>32</sup>

The introduction of a policy to limit EGM bets to a maximum of \$10 in the Australian Capital Territory did not result in behavioural change for either recreational or problem gamblers, presumably because \$10 was a higher bet than the large majority of EGM players typically made (McMillen & Pitt, 2005). However, Blaszczynski, Sharpe, & Walker (2001) (also reported in Sharpe et al., 2005) found that reducing maximum bet from \$10 to \$1 resulted in significantly decreased EGM expenditures and time spent playing. Furthermore, arguing from primarily a theoretical perspective, both Livingstone & Woolley (2008) and the Australian Productivity Commission (2010) concluded that reducing the maximum bet size to \$1 would significantly reduce the harm from EGMs, both because of the lower losses that would be incurred and because problem gamblers are much more likely to bet more than \$1 per spin.

### Payback Percentage

Payback (or payout) percentages on EGMs vary from 60% to 101%<sup>33</sup>, with many countries mandating a minimum payback percentage. In Poland, no payback percentage is mandated by law (Dzik, 2009). In the Netherlands, a payout ratio of at least 60% is required in EGMs outside

---

<sup>32</sup> There are several other possible reasons for the lower current rates of problem gambling in European countries (e.g., longer exposure to legal gambling).

<sup>33</sup> In Nevada, it is not uncommon to have one or two machines in a venue paying more than 100% so as to draw in customers (who end up playing the lower payback machines because the machine with 100+% is in constant use).



of casinos and 80% for casino EGMs. In the U.K. payout rates start at 70%. In Spain the minimum payback rate is 75% (Becona, 2009). In Nevada it is 75% and 78% in New Jersey. In Belgium the minimum payback percentage is 84% (Druine, 2009). In Australia the payback percentage ranges from 85% to 90% (Australian DFHCSIA, 2012). In Canada it varies between 85% and 92% depending on the province and whether it is a video lottery terminal (in a bar) or a slot machine (in a casino).

Somewhat surprisingly, empirical research has failed to find a strong association between payback percentage and player behaviour. For example, in a laboratory simulation, Weatherly and Brandt (2004) found that percentage payback rate (75%, 83%, and 95%) did not influence EGM gambling behaviour over a 15 minute session. Similar findings have been obtained by Gillis, McDonald, & Weatherly (2008) and Weatherly, Thompson, Hodny, & Meier (2009). A contrary finding was obtained by Haw (2008b), where participants did show a behavioural preference for machines with higher payback percentages. An overall review of this literature by Parke (2010) found no empirical support that payback percentage was related to the development of problem gambling.<sup>34</sup>

From a theoretical perspective, higher payback percentages will produce higher reward frequency, and heightened prospects for an 'early big win', both of which will normally strengthen the behaviour. However, this is offset by the fact that higher payback percentages will also be associated with less financial loss and harm. Thus, there is certainly a payback range that should theoretically have a closer relationship with problem gambling: i.e., one that offers a high enough reward frequency but also ensures significant financial losses and 'chasing' (these conditions will also maximize profit for the operator). Thus, the fact that almost all EGMs have a payback rate between 75% and 92% is probably no coincidence.

### Interactive Features

The increasingly interactive nature of EGMs almost certainly promotes the illusion of control (Griffiths, 1993; Langer, 1975). However, there has been very little empirical research that investigates the magnitude of this effect on EGM play. Loba, Stewart, Klein & Blackburn (2001) found that gamblers did not believe that the presence or absence of a 'stop reel' function (button) would alter gambling behaviour. Despite this perception, two studies that examined actual behaviour found the 'stop reel' function significantly increased the length of gambling sessions (Ladouceur & Sevigny, 2005) and money gambled (Corporate Research Associates, 2006). In the latter study, higher risk gamblers were most influenced.

---

<sup>34</sup> These general findings are consistent with the fact that consumer patronage tends to be highest for forms of gambling with the *lowest* payback percentages (i.e., lotteries, instant win tickets), and lowest for forms of gambling with the highest payback percentages (casino table games, sports betting).

## Pop-Up Messages

Ladouceur & Sevigny (2003) investigated the effectiveness of two different pop-up messages on 30 EGM players. The study found a significant reduction in the number of bets made by players who saw a message about randomness and by players who simply saw the word 'break' compared with a group not exposed to pop-up messages. They hypothesized that pop-ups interrupted cognitive processes that tended to facilitate narrowed attention and 'loss of reality'. Schellinck & Schrans (2002) found that an EGM pop-up message after 60-minutes of continuous play (and 30 again minutes thereafter), telling players how long they had played and asking if they wished to continue, resulted in a small but significant reduction in session length and expenditure among higher-risk players. In the second phase of this study, Schrans, Grace and Schellinck (2004) found that a pop-up message after every 30 minutes produced no significant improvement over the 60 minute message. However, habituation to these messages was noted as a potential problem to the maintenance of this effect. Relevant to this finding is another laboratory study involving 92 university students which showed that participants recalled translucent, dynamic messages scrolling across the EGM screens to a significantly greater extent than government-mandated static messages (Monaghan & Blaszczynski, 2007). Cloutier, Ladouceur, and Sevigny (2006) found that pop-up messages regarding erroneous beliefs produced a significant decrease in these targeted beliefs at post-test. Jardin & Edelgard (2009) found that college students given occasional messages that correctly described the random nature of a computerized game spent less virtual money gambling, played fewer trials, and were more likely to quit when they still had money remaining. An electronic banner message indicating that VLT outcomes were random produced a significant two week decrease in hours playing VLTs (from 8.59 hours to 6.91 hours) in 54 Canadian VLT players, with this impact being greater for problem gamblers (Gallagher, Nicki, Otteson, & Elliot, 2011). However, this behavioural impact was not maintained two weeks after the banner ended, and only 64.3% of participants participated in both the post-banner and follow-up assessments.

Similarly, the animated video produced by the Ontario Problem Gambling Research Centre and the Ontario Lottery and Gaming Corporation was able to reduce the frequency of exceeding self-set financial limits when measured immediately after the viewing. Although this impact may constitute "proof of principle" evidence that behaviour change *can* occur, it was not sustained over a period of 30 days (Wohl et al., 2010). Researchers are subsequently assessing modifications to the intervention and to the gambling environment (e.g., removing ATMs from the slots floor) as strategies to sustain the behavioural impact.

There is at least one study that has not found any impact of pop-up messages. Wynne & Stinchfield (2004) found that pop-up reminders indicating how much time the person has played did not influence the amount of money spent on VLTs.

## On-Screen Clocks

Playing longer than planned is a risk practice that increased the likelihood of developing impaired control over gambling. Accordingly, researchers have explored the value of introducing clocks into play. Schellinck and Schrans (2002) found that an on-screen clock was associated with improvements in keeping track of time and staying within desired time limits, but had no effect in reducing session length or expenditure. An on-screen clock also had no effect on gambling behaviour in a study by Wynne and Stinchfield (2004). EGM gamblers in a Quebec study reported that having a clock was not a helpful tool in promoting responsible gambling (Ladouceur & Sevigny, 2009).

## Mandatory Cash-Out

A recent naturalistic study of EGM play found a logarithmic distribution of time spent playing EGMs, with a median gambling duration of 13 minutes, an average of 24 minutes and a maximum of 525 minutes (Townshend & Stansfield, 2007). Only 10% of players play for one hour or more, which suggests that time limitations or mandatory cash-outs may have some theoretical utility. However, the only formal research on this issue is a study by Schellinck and Schrans (2002) which found that mandatory cash-out after 145 minutes of continuous play did not alter average EGM session length or expenditure. To date, shorter cash-out periods have not been investigated. The Netherlands has a mandatory cash-out when €40 or more has been won on EGMs located in restaurants.

## Privacy

There is conflicting evidence about the effects of privacy. Video lottery terminal players reported that placing VLTs in isolated areas of bars and taverns likely contributed to impaired control in a study by Ladouceur, Jacque, Sevigny, and Cantinotti (2005). However, a laboratory test using these same people did not find that a secluded setting increased their gambling. Similarly, Lucas & Roehl (2002) found that video poker machines located centrally in a Las Vegas casino had significantly higher revenue compared to machines in all other locations, which they attributed to central machines being more easily accessed and having higher traffic volume. On the other hand, a laboratory study by Mishra, Morgan, Lalumiere, & Williams (2010) found that having someone directly observe their VLT play resulted in a very significant reduction in the amount of time played among 180 male gamblers. The effect was similar for male and female observers, and occurred for both problem and non-problem gamblers. A laboratory study by Rockloff & Greer (2011) had a similar finding in that participants made smaller bet sizes and had greater final payouts when their EGM play was being observed compared to when it was not.

## Money versus Credits

Although it is believed that the use of credit and debit cards increases spending relative to actual cash, there is not much evidence on this topic with respect to EGMs. EGM gamblers in a Quebec study reported that having a cash display was a helpful tool in promoting responsible gambling (Ladouceur & Sevigny, 2009). Similarly, Loba et al. (2002) found that pathological gamblers reported that a money won/lost display was superior to a credit display in helping to stop playing. However, there is a lack of behavioural evidence to support these beliefs. For example, money (versus credit) counters on VLTs were not found to influence gambling behaviour in a study by Wynne and Stinchfield (2004). In Canada, although all EGMs outside of casinos (i.e., 'VLTs') pay winnings via a credit slip rather than cash, there tends to be very little difference in their revenue generation compared to cash-paying slot machines inside gambling venues (Canadian Gambling Digest, 2004; Williams, Belanger, & Arthur, 2011). In the Australian Capital Territory, policies to restrict EGM *cash* payments to winnings less than \$1,000 simply caused gamblers to cash out their winnings before the \$1,000 limit was reached and then resume play (McMillen & Pitt, 2005).

## Lights and Sounds

Although there is considerable speculation and observational commentary about the effects of lights and sounds on EGM behaviour (e.g., Griffiths, 1993; Griffiths & Parke, 2003), there is relatively little empirical research. There is some evidence that alterations of light and sound are related to subjective enjoyment of EGM gambling (e.g., Loba et al., 2001). In one of the few empirical studies, Delfabbro, Falzon, and Ingram (2005) found that EGMs with 35% lower illumination significantly increased either the number of plays or time spent playing. However, the presence or absence of sound did not influence gambling behaviour. Further investigation is needed to determine whether such features have differential effect on problem gambler sub-types such as those posited by Blaszczynski and Nower (2002). The 'emotionally vulnerable' sub-type, for example, gambles to cope with negative affect and may be drawn to more calming environments and games, whereas the 'impulsive anti-social' sub-type may seek more stimulating environments.

Some jurisdictions (e.g., Netherlands, Spain) prohibit sounds and flashing lights when a slot machine is not occupied (Gourdriaan, de Bruin, & Koeter, 2009; Becona, 2009).

## Seating

Seating is commonly provided for EGM players in many countries, but is less common in the low stake low prize machines in Europe. Although there is no research on the impact of having seating, it seems fairly obvious that the duration of EGM play would be shortened without it.

## Summary of EGM Parameter Modifications

In summary, the above research on EGM features has identified several measures that appear to have some potential to reduce harm. Such features include: eliminating early big wins (perhaps by decreasing maximum win size), slower speed of play, reducing the frequency of near misses, reducing the number of betting lines, eliminating bill acceptors, reducing the interactive nature of EGMs, presenting dynamic pop-up messages, reducing maximum bet size, and perhaps, reducing the availability of seating. There is insufficient evidence to support the utility of: varying payback rates, establishing a maximum win size, requiring mandatory cash-outs, introducing on-screen clocks, substituting monetary for credit displays, providing less privacy, and manipulating ambient light and sound.

There are two important caveats about this research. The first is that almost all of these studies have been conducted on people with prior EGM experience. Accordingly, the effectiveness of EGM parameter modifications as primary prevention tools, while plausible, is less certain. Second, the magnitude of the effects tends to be small. The reality is that any automated device employing a variable ratio schedule (or more properly, random ratio schedule) with significant reinforcers and an event frequency of 5 seconds will tend to produce very strong behavioural patterns that are resistant to modification or extinction (Ferster & Skinner, 1957).<sup>35</sup> Thus, EGMs will likely always be ‘high-risk’ devices with a strong association to problem gambling. In many ways, efforts to mitigate the harm of EGMs is reminiscent of the ultimately unsuccessful efforts to mitigate the harm of tobacco consumption by putting filters on cigarettes or promoting low-tar varieties of tobacco.

## Player Pre-Commitment

“Pre-commitment” refers to a strategy whereby pre-set limits on time, frequency, or money spent gambling are registered prior to the start of play. Pre-commitment is believed to be a useful harm minimization strategy because it allows players to make rational decisions about gambling involvement prior to actually engaging in gambling and obliges them to retain these limits despite subsequent temptations that arise during play (Parke, Rigbye, & Parke, 2008). Research indicates it is fairly common for regular gamblers (including problem gamblers) to have budgetary limits in mind prior to gambling but to exceed these limits as play progresses (McDonnell-Phillips, 2006; Focal Research Consultants, 2010).

---

<sup>35</sup> Indeed, there are many who would argue that operant conditioning is the main theoretical framework with which to understand EGM play (Delfabbro, Falzon, & Ingram, 2005; Delfabbro & Winefield, 1999a, 1999b; Dickerson, 1979; Dickerson, 1993; Dickerson, Cunningham, Legg-England, & Hinchy, 1991; Dickerson, Hinchy, England, et al., 1992; Dixon & Schreiber, 2002; Knapp, 1976; Petry & Roll, 2001). However, while principles of learning (both operant and classical) are likely of fundamental importance, it is clear that they are insufficient on their own. While pigeons pecking keys for food under a variable ratio schedule will all develop very persistent behaviour, only a minority of people who play EGMs find them appealing and continue playing them. Secondly, the evolutionary purpose of operant conditioning is to shape behaviour so as to optimize returns. Excessive EGM play (i.e., problem gambling) is not an adaptive response to the environmental contingencies these machines offer.

**Online gambling** is very well suited for pre-commitment, as unlike most types of land-based gambling, all activity is electronically recorded and linked to an identifiable individual. Consequently, pre-commitment has been offered for several years on a small portion of the ~2,400 existing online gambling sites (Griffiths, 2012; Williams, Wood & Parke, 2012ab). The pre-commitment parameters available to online gamblers vary depending on the site. Most common are deposit limits (e.g., daily, weekly, monthly); bet size limits; loss limits (e.g., weekly, monthly, yearly); short-term exclusion from certain game types (e.g., 6 months); and short-term account suspension (e.g., 6 months). For most sites, deposit and loss limits tend to be revocable, but account suspension irrevocable (Williams, 2010). Some of the voluntary online gambling regulatory bodies (e.g., e-Commerce and Online Gaming Regulation and Assurance ([eCOGRA](#))) require some form of pre-commitment for site accreditation. Currently, however, there is no system in operation which links all Internet gambling sites within a jurisdiction, or across jurisdictions, with an integrated self-exclusion or pre-commitment regime (Williams, 2010). Accordingly, all player-determined parameters and limits can be ignored simply by changing sites.

For **land-based gambling**, pre-commitment is most often implemented using a ‘smart card’. A smart card is any pocket-sized plastic card with embedded integrated circuits providing some limited memory and/or microprocessor capabilities when interacting with external card-reading devices. Smart cards have often been used for Player Loyalty/Reward cards and/or as debit cards for cashless gambling. Sometimes these same cards are programmed to allow pre-commitment and sometimes the pre-commitment card is a different card altogether. In 2002 the Crown Casino, in Melbourne, Victoria was the first casino in the world to introduce player pre-commitment monetary limits on a smart card for EGM play. Since 2002 smart cards have been introduced throughout Victoria, as well as Queensland, New South Wales, Nova Scotia, New Zealand, Sweden, Denmark, and Norway (Regis Controls, 2009; Williams, 2010). Pre-commitment is for EGMs only in Victoria, Queensland, and New South Wales; for VLTs only in Nova Scotia; for online lotteries only in New Zealand; for online poker and sports betting, as well as land-based bingo, lotteries, and sports betting in Sweden; and for all forms of online and land-based gambling in Norway.

There has been some research on the effectiveness of pre-commitment:

- Schrans, Grace and Schellinck (2004) found that a feature allowing players to set a time limit on their VLT play was only effective in influencing one of the six behaviours being targeted for improvement.
- Anecdotally, problems have been expressed about the effectiveness of pre-commitment when non-card EGMs are also readily available (as is the case in New South Wales (NSW)) (Nisbet, 2005). There is also a concern that because of the significant amount initially put on the card (e.g., \$200 in NSW) gamblers may increase spending, either due to more money being readily available or because they require less embarrassing interactions with cashiers and other venue staff (Parke, Rigbye, & Parke, 2008). That being said, people who have opted to use cards for pre-commitment and have agreed to report on their use tend to indicate that the card helped them better manage their spending (Nisbet, 2005).

- Focal Research Consultants (2007) tracked VLT play for a 6 month period in a region of Nova Scotia that only had player-card activated machines available (~51 EGMs in 9 locations played by 1,824 players). Roughly 71% of regular players (i.e., those playing once a month or more) opted to try one of the responsible gambling (RG) features included on the cards (i.e., spending limit, time limit, 2 day exclusion, or playing history reports). Roughly 65% of these people continued to use one or more RG features in subsequent sessions. A subsample of these RG adopters (n = 122) had a baseline period of non-RG use that allowed for a pre-post comparison. These individuals were found to have a significant decrease in per session expenditure (\$47 to \$40), an increase in play length (82 min to 98 min), and no change in frequency of play per month (9.3 to 9.3). Examination of individuals with high risk characteristics found no decrease in expenditure for high frequency players (18+ times in 6 months). People with Canadian Problem Gambling Index (CPGI) scores of 5 or higher showed a tendency toward decreased per session expenditure, but this outcome was offset by a tendency toward increased frequency of play. It was also found that approximately 37% of players swapped cards and/or obtained them from venue staff to circumvent the system, with this being particularly true for people with higher CPGI scores (Bernhard et al., 2006; Omnifacts Bristol Research, 2007). Follow-up research by Focal Research Consultants (2010) on the roll-out of the province-wide pre-commitment found that although most gamblers reported that they needed pre-commitment (endorsed by 98% of problem gamblers), only a minority planned to use it (as adoption was voluntary). This turned out to be an accurate prediction, as only 2,740 players were voluntarily enrolled in the “My-Play” pre-commitment system by December 2010 (roughly 2.8% of VLT players). The program was subsequently made mandatory in April 2012.
- Results from the 2009 Worldsmart South Australian (SA) trial showed that fewer than 1% of loyalty card holders had voluntarily activated the pre-commitment options on their card (Productivity Commission, 2010). For those who did, the most popular options were limits on: daily spending (59% of cards); breaks in play (19%); weekly spending (14%); monthly spending (12%); daily duration of play (10%); monthly duration of play (8%); fortnight spending (6%); weekly duration of play (4%); fortnight duration of play (4%); and spending history (3%). Utilization of pre-commitment features tended to increase with time. Among the 94 individuals with 3 months of baseline data, there was a 25% reduction in daily turnover subsequent to utilization of pre-commitment. However, it is possible these individuals continued to gamble and simply decreased use of their voluntary card. There were also 600 instances where players exceeded their pre-established limits (in the SA system, when a limit has been met it can be overridden by venue staff). It is not known what percentage of pre-commitment breaches this 600 figure represents (Productivity Commission, 2010).
- Results from the 2009 Queensland Maxgaming’s Simplay system showed that only 15% of Simplay cardholders used pre-commitment, although this percentage may be higher for at-risk groups (Productivity Commission, 2010). The most popular option (13%) was a daily spending limit. No one set playing time limits. There was tentative evidence that expenditure may have decreased subsequent to limit setting. However, here again, this assumes that players did not continue playing using cash (i.e., once a limit was exceeded the only consequence was the inability to use the card for cashless gambling). Since the system

has been expanded throughout Queensland approximately 14,000 people have opted to use this voluntary system. Of these, 9% have set spending limits (with this percentage increasing over time). Results from the Odyssey trial in Queensland were similar, with only 5% of players opting into cashless gambling (that would also allow pre-commitment), and 28% of these individuals opting to set a daily spending limit. Sixty percent of users reported that pre-commitment was useful, with this percentage being higher for high-risk players. There was also a 40% reduction in spending by players who set limits compared to a 3% reduction in players who did not set limits. However, this reduction might be offset by increased cash-based play, which continued to be available (Productivity Commission, 2010).

- Because of the mandatory nature of the Swedish and Norwegian systems, a large percentage of the gambling population has obtained smart cards (in 2008 this was roughly 1.3 million Swedes and 1.9 million Norwegians) (Responsible Gambling Council, 2009).
- The Internet Poker Committee (2008) (cited in Responsible Gambling Council, 2009) surveyed approximately 3,000 participants of the Swedish online poker pre-commitment system. Participants reported that a) monetary limits were more useful than time limits; b) 1/3 of players set monetary limits that were excessively high and 40% set time limits that were excessively high (essentially disabling the pre-commitment system); c) for individuals who hit their limits, 37% went to another online site and 32% simply changed their limits; d) 5% of players barred themselves for a period of time, with one week being the most common length (25% of people who barred themselves also began playing online poker at other sites); e) 26% used the risk assessment option and 52% of these individuals found it useful.

In summary, there does not exist an abundance of research on the effectiveness of pre-commitment, but that which does exist indicates that it holds promise as a harm-minimization technique (Griffiths, 2012; Parke, Rigbye, & Parke, 2008; Productivity Commission, 2010; Williams, 2010). Part of the problem in evaluating pre-commitment arises from the many different ways it can be implemented (i.e., mandatory or voluntary; exceedable vs. non-exceedable limits; revocable vs. non-revocable limits; short vs. long duration of limits; presence on all or just some EGMs; etc.). Similar to research on other problem gambling prevention initiatives, the 'devil is in the details' and the actual effectiveness of a technique is usually very much dependent on how it is applied. Drawing on the lessons of problem gambling prevention research, it is reasonable to surmise that the degree to which pre-commitment is voluntary<sup>36</sup>, revocable, exceedable, of short duration, limited to some (but not all) EGMs or some Internet sites, limited to some (but not all) forms of gambling, and does not use biometric ID or some other form of identification that deters identity swapping, is the degree to which the utility of the technique is primarily limited to non-problem gamblers (which may or may not translate into a decreased future incidence of problem gambling). In contrast, the degree to which all

---

<sup>36</sup> Nower and Blaszczynski (2010) found a positive, linear relationship between gambling problem severity and specific limit-setting before the start of a gambling session. In essence, 'at risk' and problem gamblers were much less likely than regular gamblers to use a pre-commitment strategy when it was optional.



avenues for excessive gambling have been closed, is the degree to which the technique likely has broader utility for problem and non-problem gamblers.<sup>37</sup>

### Eliminating Reward/Loyalty Cards or Changing Their Parameters

An additional consideration in relation to smart cards and pre-commitment concerns their increasing incorporation within Reward Cards or Loyalty Cards (also sometimes known as Player Cards). In jurisdictions with a single monopolistic provider of gambling it is unclear why a “loyalty” card is needed. In these jurisdictions, Reward cards and ‘comps’ simply serve to reward people for their amount of gambling so as to induce them to gamble even more (which they successfully do) (Lucas & Bowen, 2002; Lucas & Kilby, 2008; Suh, 2012). This is obviously not conducive to responsible gambling, and is a practice that would not be acceptable for alcohol or tobacco consumption. Although there may be better justification for loyalty/reward cards when there are multiple providers for customers to choose between, rewarding people for the amount they gamble is still incompatible with efforts to constrain gambling behaviour through pre-commitment. Furthermore, in addition to promoting further gambling, these rewards/‘comps’ likely helps heavy gamblers and problem gamblers to reconcile their losses. Thus, reward/loyalty cards *should not be combined* with pre-commitment technologies.

Obviously, there are inefficiencies in having two cards rather than one. The solution to this requires either a non-carding biometric ID system for both, or to change the typical parameters of Reward/Loyalty cards. If Reward/Loyalty cards are to be combined with pre-commitment, then they should be rewarding **responsible play**, rather than amount of play. One way in which this could be operationalized is for players to receive no points after exceeding a reasonable operator-set daily level of spending, and/or losing points after exceeding this threshold. Another possibility is for players to be unable to collect their reward points if they have exceeded their pre-commitment level (the problem with this latter strategy is that it will tend to encourage high pre-commitment levels). Providers could also award points for socially responsible and self-protective behaviour, such as viewing educational resources, completing personal risk assessments, or comparing personal consumption patterns to normative standards.

Another useful strategy would be to use the data concerning the player’s gambling behaviour to proactively alert the player to patterns of behaviour that are associated with future problems (see Automated or Mandated Intervention Section later in this document). As things currently stand, providers collect such data from the Reward cards and actively respond to it through increasingly strong inducements to gamble more. Within the data base are clear indicators of frequency, duration, average bet size, and net amount won or lost. If for no other reason, operators having direct knowledge of increased potential for harm and failing to act in

---

<sup>37</sup> One of the defining features of problem gambling is ‘impaired control’ (Neal et al, 2005). Hence, it is naïve to think that simply providing problem gamblers with information about their gambling and/or ‘choice’ will be sufficient to curb their gambling.

the interests of protecting the patron fails to meet contemporary standards for corporate social responsibility (Hancock, Schellnick, & Schrans, 2008; Smith & Rubenstein, 2011). At worst, it might be grounds for legal liability from a 'duty of care' perspective.<sup>38</sup>

A final consideration is that widespread adoption of a Reward/Loyalty Cards would also allow these cards to be used for casino entry, so as to strengthen the self-exclusion programs for those few countries that currently do not require ID to enter casinos.

### Operator Imposed Maximum Loss Limits

In many gambling venues, there is no limit to the amount a patron can bet and/or lose over the course of a gambling session.

When maximum loss limits are imposed on patrons it typically occurs in the context of government-owned/operated *online* gambling sites. However, in most cases the limits are very high, thus affording very little true protection for most people<sup>39</sup>. A few exceptions exist. For example, the New Zealand online lottery requires players to set weekly and monthly spending limits, with a maximum of NZ \$150/week and \$300/month (New Zealand Lotteries Commission, 2012).

It is very rare for land-based venues to have maximum loss limits. An important historical exception to the use of operator imposed maximum loss limits is the state of Missouri, which from 1994 – 2008 had restricted each gambler's losses to a maximum of \$500 during two hour 'excursions' on its 11 riverboat casinos (patrons could buy no more than \$500 in gambling chips for the slot machines and table games). There is no information on the effectiveness of this measure other than the Missouri casino industry repeatedly pointing out that their revenues were much smaller than competing riverboat casinos in neighbouring jurisdictions (Brokopp, 2006; Volkmann, 2008).

The most important current example is found in Norway. Since February 2009 the use of smart cards has become mandatory in Norway for EGMs, sports betting, and online gambling. Norsk Tipping limits the amount that can be put on the card to 400 kroner per day (~\$67 U.S.) or 2200 Kroner per month. Although promising in theory, there has been no evaluation of this operator-imposed limit.

---

<sup>38</sup> A 2009 newspaper story in the province of Ontario accessed Reward card information for a slots-at-racetrack facility and found that the highest recorded annual loss was \$701,117. This member attended the venue 294 times over the course of the year. The 10 program members recording the highest losses averaged \$455,555 for the year, or \$38,796 per month. Each dollar lost was recorded in the loyalty program data base, and the operator applied direct knowledge of mounting losses to the awarding of 'comps' (Priest, 2009).

<sup>39</sup> For example, British Columbia allows players to transfer \$9,999 per week into their online gambling account.

## Proactive Intervention with 'At-Risk' Gamblers

### Problem Gambling Awareness Training for Employees of Gambling Venues

Problem gamblers in gambling venues are known to display reliable behavioural cues (i.e., anger, repeated withdrawals from ATMs, etc.) (Allcock et al., 2002; Delfabbro, Osborn, Nevile, et al., 2007; Delfabbro, Borgas, & King, 2011; Schellenick & Schrans, 2004). Accordingly, in the past 10 years problem gambling awareness training has been initiated in many countries to increase employee recognition of problem gambling among patrons and to direct these patrons to appropriate treatment resources. Programs are variously delivered by venue owners/operators, departments of health/addiction agencies, contracted companies, or combinations thereof. Program design tends to be based on collaborative consultation among government, gambling industries, and prevention/treatment agencies. Staff training for venue staff is mandatory in several jurisdictions, and is sometimes also required of EGM site holders/staff and lottery retailers. Front line employees at casinos typically receive a one-time knowledge and skill development session to understand and recognize problem gambling behaviours in patrons so as to alert their supervisors to these individuals. More extensive training is typically provided for supervisory and management personnel at casinos, whose responsibilities include approaching the identified individual to offer immediate crisis management or treatment referral.

In the late 1980s, Holland Casinos was the first gambling operator to provide an intensive training and education program for employees (d'Hondt, 2007). Manitoba, Canada was one of the first North American jurisdictions to implement an employee training program, beginning in 1998. Since then all Canadian provinces have implemented either mandatory or voluntary programs. Awareness training for employees also occurs in many other countries. In South Africa, the National Responsible Gambling Program (a collaborative public/private initiative), encourages and provides voluntary industry staff training. Harrahs, in the United States, has operated 'Operation Bet Smart' for several years (Harrahs Entertainment, 2004). As of 2003, staff training became part of the American Gaming Association's Code of Conduct for Responsible Gaming. The European Casino Association's Code of Conduct has similar provisions, ratified by the 20 member countries in January 2006. The World Lotteries Association Code of Conduct also includes a problem gambling employee training component. New Zealand's 'Host Responsibility Training' (a model of responsible gambling on which venue licensing is conditional) includes a mandatory staff training component.

Research on the effectiveness of training programs is limited. The Addictions Foundation of Manitoba found that 98% of 1,550 video lottery terminal (VLT) site-owners and employees reported finding the training useful (Smitheringale, 2001). Employees of three casinos in Quebec reported improved knowledge about gambling and increased confidence in identifying gamblers in crisis (Giroux et al., 2008). However, this study was limited by a response rate of only 32%. Ladouceur et al. (2004) found that VLT retailers in Quebec reported greater confidence in recognizing and addressing problem gambling after receiving a 2 hour problem gambling awareness workshop, and also reported approaching problem gamblers more

frequently than new retailers who had not yet attended the workshop. In a later study, Dufour, Ladouceur & Giroux (2010) found that 2.5 hours after employees at VLT venues were exposed to a training session they showed improved attitudes toward problem gamblers, increased knowledge about how to help, and increased propensity to provide information pamphlets to VLT patrons and to talk to them about helpful resources. However, 8 months later, although the improved attitudes and knowledge were partly maintained, the behavioural changes were not. In a very recent study, LaPlante et al. (2012) found that training produced an improvement in responsible gambling knowledge among gambling industry employees one month following the training program ( $n = 217$  at baseline and 116 at follow-up).

A comparable, well researched initiative is training of alcohol servers to not serve intoxicated patrons. A systematic review of this evidence shows several instances where this training has resulted in the desired effect, but just as many instances where compliance with the training has been poor (Ker & Chinnock, 2006). Some of the main factors interfering with the effectiveness of this training include the likelihood that intervention will compromise profits; the voluntary nature of the training (in some jurisdictions); the lack of enforcement by regulators; and a low-skilled work force with high turnover and personal drinking habits that are inconsistent with these interventions (Ker & Chinnock, 2006; Mosher, Toomey, Good, Harwood, & Wagenaar, 2002; Reiling & Nusbaumer, 2006). It is important to note that all of these barriers to compliance also apply to the gambling industry (Dangerfield, 2004; Hing & Nuske, 2011; Shaffer et al., 1999; Shaffer & Hall, 2002; Williams & Wood, 2004, 2007a; Guttentag, Harrigan, & Smith, 2012).

Screening prospective gambling employees for problem gambling may be a policy initiative that could be helpful in addressing hesitancy to intervene because of inconsistency with personal practices. Automated or mandated intervention with 'at risk' players is another policy with potential to reduce harm (Hing & Nuske, 2011).

### Automated or Mandated Intervention

Swiss casinos train employees in the use of a behavioural checklist to detect patrons who are likely experiencing problems with gambling. If checklist criteria are met *they are obliged* to approach the patron to ascertain whether either a visit limitation or ban (voluntary or involuntary) is warranted (Hafeli, 2009). An evaluation of the Swiss program in 2006 found that there were 1,543 people approached by casino staff in the 6 casinos. However, a) this roughly translates into only 1 approach for every 1,000 casino admissions; and b) the majority of these 'approaches' consisted of a single conversation. Moreover, only 16.6% of people who registered for a self-exclusion ban in 2006 had been involved in this 'early detection' system (Hafeli & Lischer, 2009).

A better on-site intervention system exists in the Netherlands. The requirement to show ID also allows Holland Casino to track the frequency of casino visits. If the computer indicates a significant increase in visitation frequency or 20 visits a month over three consecutive months, then the person is *automatically approached* to see whether they would like to sign a visit

limitation or self-exclusion contract (Bes, 2002). Only 18.5% of these approaches are perceived negatively by the patron (Bes, 2002). In 2004, a total of 21,360 interviews with patrons resulted in 3,155 visit restrictions and 4,423 admission bans (Holland Casino, 2009). Indirect evidence of the utility of Holland Casino's approach lies in the fact that the number of people seeking help for problem gambling from the official social services is only 50% of what these numbers were in 1995 (Holland Casino, 2009); patron surveys show that only 5% of patrons at any given time are pathological gamblers (2% of all patrons) (d'Hondt, 2007); and the fact that the Netherlands has one of the world's lowest rates of problem gambling (Williams, Volberg, & Stevens, 2012).

To enter casinos in Austria, patrons have to use an issued ID card which is used to record the frequency and duration of casino attendance. If the person has entered the casino 90 days or more in the previous 180 days and he/she falls into the top 5% of people in terms of attendance frequency, the person is given a letter informing him that his/her gambling habits are deemed to be problematic and about the risks of continued gambling. Moreover, the visitor's ID card is invalidated and he/she is temporarily banned from entering casinos. The more often a visitor is banned, the longer each ban becomes. After 7 bans the ban becomes permanent (EuroPriSe, 2011).

The analysis of Reward/Loyalty Card data or online player activity provides additional opportunities for proactive intervention (Schellinick & Schrans, 2011). Several investigators have been researching behavioural markers of risky play from Reward Cards and online player activity for the purposes of proactively alerting the player or/ or implementing some type of automated restriction/intervention (Braverman & Shaffer, 2010; Broda et al., 2008; Gainsbury, 2011; Tsogas, Dragicevic & Kudic, 2011):

- The Saskatchewan Gaming Corporation (SGC) contracted with Focal Research to identify behavioural patterns associated with problem gambling in Reward Card data (Davies, 2007; Schellenick & Schrans, 2004; 2006). Beginning in 2006, these behavioural markers (iCare system) were used to allow designated staff to approach and interact with high risk gamblers in the two government-run casinos (Davies, 2007; Saskatchewan Gaming Corporation (SGC), 2006). (Interestingly, the program was portrayed as a voluntary assumption of the operator's duty of care owed to its patrons). Subsequent research has demonstrated that these interactions have a significant effect on reducing player risk levels (SGC, 2008). In fiscal 2006/2007 1,436 interactions occurred (SGC, 2007) and in fiscal 2008/2009 there were 26.4 interactions per day, exceeding the target of 26 per day (SGC, 2009).
- In 2007, the Ontario Problem Gambling Research Centre launched an innovative initiative in collaboration with the Ontario Lottery & Gaming Corporation. In this system, high frequency (once a week or more over the past year) members of the Reward Card program received a mailed "brief motivational intervention". The intention was to educate recipients about impaired control, offer a means for self-assessment, argue that early intervention (before debt becomes unmanageable) is preferable to later intervention, and provide a confidential link to a controlled gambling counselling program. Telephone surveys were conducted to test the effectiveness of the letter and the results were, in

general, positive, with the most favourable impact among those who identified with the at-risk behaviours described in the letter.

- In New Zealand, the Gambling Commission has mandated the Auckland SkyCity Casino to use reward card data to track EGM expenditure per session and visitation frequency and to potentially exclude anyone exceeding certain parameters (Collins, 2007). More specifically, someone who visits the casino at least 5 times a week and spends more than \$300 on EGM machines per session, or visits at least twice a week and spends at least \$500 a session, is deemed to be a potential problem gambler and must be excluded unless the casino considers they can continue to gamble without harm.
- In 2007 Sweden introduced a system called [Playscan](#). Gambling behaviour on the government-owned online gambling site is monitored and a patron is alerted when he/she engages in behaviour that is statistically associated with the onset of problem gambling (they are told they are displaying either 'at risk' or 'problematic behaviour' (Svenska Spel, 2007). An internal evaluation of 820 Playscan users is contained on their [website](#). Of those receiving notification of 'problematic behaviour', 48% reported that their gambling habits had been influenced by the feedback (12% had started to play less). Of those receiving notification of 'at risk behaviour', 41% reported being influenced by the feedback, with 7% indicating they had started to play less.

Although proactive intervention with 'at-risk' gamblers has not received extensive evaluation, this type of intervention is almost always going to be less costly and more effective than treatment and rehabilitation of established gambling problems. The only caveat to this concerns the fact that the above-described interventions tend to be 'Educational' in nature, requiring the 'at risk' player to recognize his/her problematic gambling behaviour and voluntarily do something about it.

### Restricting Access to Money

In the United States, house credit is common practice in gambling venues. Cheque-cashing is considered to be a form of house-credit, and is also allowed in some states. Automated teller machines (ATMs) are commonly located in gambling venues, and there are often no limits on ATM withdrawal amounts.

In Canada, the granting of house credit is banned in all jurisdictions except in Ontario's commercial, resort-style casinos.<sup>40</sup> ATMs are commonly located in casinos and EGM gambling venues throughout Canada both on and off the gambling floor. Venue-imposed ATM withdrawal limits do not appear to exist, and both debit and credit transactions are generally allowed. Manitoba is unique in banning debit card use for VLT gambling. Manitoba also prohibits cheque-cashing and credit card use in casinos.

---

<sup>40</sup> These casinos also offer 'front money accounts', where patrons deposit cash reserves that can be accessed whenever desired by signing chits while gambling.

In Europe, house credit is generally banned. ATMs are generally available at gambling venues (not in Belgium), but information regarding withdrawal limit policies was not found in a search of electronically available information. Credit card use at ATMs appears to be allowed.

The Republic of South Africa (2004) does not allow credit to be provided in gambling venues, and ATMs are not allowed in any gambling venue under South African law.

Credit is banned in all Australian states and territories. ATMs and EFTPOS (Electronic Funds Transfer at Point of Sale) facilities are available at almost all gambling venues (not Tasmania and not Victoria since July 2012), although they are not permitted on the actual gambling floor. ATM withdrawals are limited to \$200 a day in South Australia and \$400 a day in Victoria. In all certain Australian states and territories (not Western Australia), winnings in excess of certain amounts (between \$250 - \$2,000 depending on the jurisdiction) are paid by cheque, and certain jurisdictions do not permit the venue itself to cash these cheques (Australian DFHCSIA, 2012).

In New Zealand, credit card use to a limit of \$200 per day is allowed. There appear to be no limits on ATM withdrawals, and regulations require that ATMs be located away from gambling areas within gambling venues.

In Asia, credit is permitted at Macau casinos but prohibited at Singapore casinos (Godinho, 2006; Ling, 2007).

There is a lack of empirical research examining the effectiveness of monetary restrictions. However, anecdotal and existing survey data indicate that restricting ready access to cash is a potentially effective strategy. First, it is well established that problem gamblers access cash machines more frequently than regular gamblers (Allcock, 2002; Caraniche Pty Ltd., 2005; Independent Pricing and Regulatory Tribunal, 2004). Second, problem gamblers in treatment report that the most common reason for terminating a gambling session and leaving a gambling venue is because they have run out of money (Productivity Commission, 1999). Indeed, self-reports of problem gamblers consistently identify easy and immediate access to cash as exacerbating gambling-related harm (e.g., Caraniche Pty Ltd., 2005; McMillen, Marshall, & Murphy, 2004; South Australian Centre for Economic Studies, 2005). The majority of 418 EGM players in Victoria, Australia were of the view that ATMs should not be located in gambling venues at all. Among this same group, this measure was deemed to be the most effective harm minimization strategy available (Caraniche Pty Ltd., 2005). A total of 72% of people who enrolled in Alberta's casino self-exclusion program indicated that they felt that restricted access to ATMs would be a 'very effective' procedure, with another 10% reporting it would be a 'somewhat effective' procedure (Alberta Gaming and Liquor Commission (AGLC), 2007).

Implementation of policies to ban credit, limit ATM withdrawals, or remove ATMs from or near gambling venues is often opposed by the gambling industry, due to the potential inconvenience to non-problem gamblers (McMillen, Marshall, & Murphy, 2004). While this may be true to

some extent<sup>41</sup>, it must be said that several problem gambling prevention policies have the same potential. As will be discussed in the Best Practices Section later in this document, the effective prevention of harm associated with potentially dangerous products (e.g., alcohol, tobacco, firearms) has always required some inconvenience to the general public in the interest of benefitting the population as a whole.

### **Restrictions on Concurrent use of Alcohol and Tobacco**

Gambling and drinking often co-occur, particularly where gambling occurs at problematic levels (e.g., Crockford & el-Guebaly, 1998; Giacomassi, Stitt, & Vandiver, 1998; Grant, Kushner, & Kim, 2002; Lorains, Cowlshaw & Thomas, 2011; Welte, Barnes, Wieczorek, et al., 2001). The link between increased drinking and increased gambling has also been demonstrated. A study on consumption of alcohol during VLT play found that length of play, rate of double-up betting, and play of losing hands increased during moderate alcohol intoxication, especially for probable pathological gamblers (Ellery, Stewart & Loba, 2005). Kyngdon and Dickerson (1999) found that alcohol consumption prolonged gambling sessions, with the potential for greater financial loss arising from increased risk taking. Other research consistently replicates the finding that alcohol has a disinhibiting effect on gambling restraint and increases risk taking (e.g., Baron & Dickerson, 1999; Cronce & Corbin, 2010; McDonnell-Phillips Pty Ltd, 2006; Phillips, Triggs, Coman, & Ogeil, 2005; Sjoberg, 1969). Given this knowledge, restrictions on the use of alcohol while gambling have significant potential as a harm minimization strategy for problem gambling.

While policies regarding the sale of alcohol in gambling venues vary worldwide, responsible service practices (e.g., prohibiting continued sale of alcohol to intoxicated gamblers) are generally either legislated or otherwise entrenched in government policy. Policies concerning free drinks and other complementary goods and services are less likely to be included in responsible gambling codes. A brief review of alcohol-related policies in various gambling jurisdictions follows:

Casinos in Canada may provide free goods and services, but not free alcoholic beverages. Alcohol service is prohibited in some British Columbia casinos, where municipal governments assume responsibility for such licensing decisions. In the United States, free drinks are provided to casino patrons in 13 of 22 states with commercial casinos (Colorado, Florida, Iowa, Louisiana, Michigan, Mississippi, Nevada, New Jersey, New York, Pennsylvania, Rhode Island, South Dakota, West Virginia) (American Gaming Association, 2012). Low-cost drinks are also common. Free and discounted alcoholic beverages are either banned or not commonly available in most European countries, except in some Eastern European countries (e.g., casinos

---

<sup>41</sup> It could be argued that non-problem gamblers tend to predetermine their spending limits and are likely to bring the appropriate amount of cash with them. In this population, ATMs only serve the minority who may have forgotten to bring cash. At-risk patrons and those with impaired control, however, by definition consistently exceed pre-set limits and 'in the heat of the moment' will use ATMs to obtain cash they had not planned to spend and may not be able to afford. Inconvenience to these patrons is actually a benefit that reduces additional loss.



in the Ukraine). Some casinos in Australia (e.g., Casino Canberra; Crown Casino, Victoria) have historically provided low-cost or free drinks for customers. 'Host Responsibility' regulations in New Zealand prohibit free drinks, and include responsible practices for serving alcohol. Free drinks are available at some Macau casinos.

Just as gambling and alcohol consumption are related, the association has been established between gambling and tobacco use. Public health campaigns beginning in the early 2000s have successfully led to implementation of 'public place' smoking bans in most jurisdictions around the world in order to reduce the well-known health risks associated with smoking and second-hand smoke. In Canada, smoking in casinos is banned in all provinces (with the exception of casinos on some First Nations reserves). In Australia, smoking is generally only permitted in private/premium gambling rooms (Australian DFHCSIA, 2012). As of July 2012, 27 U.S. states have enacted statewide bans on smoking in all enclosed public places. However, 9 of these states exempt casinos (Wikipedia, 2012). U.S. Indian casinos are also exempt. Smoking is allowed in Macau casinos. Smoking is banned in most casinos in Europe.

Smoking bans may inadvertently act as one of the more effective policies to reduce problem gambling, given that the majority of problem gamblers are smokers (e.g., Lorains, Cowlshaw & Thomas, 2011; McGrath & Barrett, 2009; Petry, Stinson, & Grant, 2005; Rodda, Brown, & Philips, 2004). It is no coincidence that gambling venues are the most common places to petition for and receive exemptions from public smoking bans. Indeed, significant 15% - 25% reductions in gambling revenues have followed gambling venue smoking bans in various jurisdictions, including Canada, Australia, New Zealand, Europe, and the United States (Atlantic Lottery Corporation, 2006; Garrett & Pakko, 2010; Hospitality Association of New Zealand, 2005; Pakko, 2008; Thalheimer & Ali, 2008). Reported revenue reductions are notable, considering that a large proportion of gambling revenue traditionally has derived from problem gamblers (Williams & Wood, 2004, 2007b). It is hypothesized that problem gamblers may be less likely to gamble for extended periods if they cannot smoke, thereby introducing a mechanism for reducing harm. Among a group of 418 EGM players in Victoria (49% of whom smoked, with significantly higher rates among problem gamblers), 67% regarded the restriction of smoking in gambling areas to be an effective gambling harm minimization strategy (Caraniche Pty Ltd., 2005). Forty-nine percent of the smokers reported that they spent less time playing EGMs, and 5% reported they spent more time. These reports were corroborated by a survey of EGM venue operators, who reported that among all the harm minimization measures, the smoking ban was the most effective (Caraniche Pty Ltd., 2005). In New Zealand, a 15.8% drop was seen in the number of government-funded problem gambling service users after the first year of the smoking ban (New Zealand Ministry of Health, 2006).

Interestingly, there is also evidence that EGM and casino revenues may return to their previous levels after smoking bans have been in place for some time (e.g., Buchanan, 2006, p. 13, citing Tattersall's 2005 Annual Report: "Gaming revenue returned to full-year growth following the downturn after the introduction of smoking bans in Victorian gaming venues in 2002"). There is no empirical research to indicate whether this is due to smokers (and problem gamblers) having

adjusted to this requirement, or non-smokers patronizing gambling venues at higher rates because of the smoke-free environment.

### Restricting Advertising

Almost all countries have consumer protection legislation that requires ‘truth in advertising’, which should theoretically curtail attempts to portray gambling as harmless, safe or a good way to make money. Beyond this, many countries have specific legislation that place additional constraints on gambling advertising. For example, most European countries limit the amount of gambling advertising and/or make it mandatory to inform people of the associated dangers (European Commission, 2006; Research and Service Development Centre, 2007).

In some jurisdictions the amount of money devoted to promoting gambling participation is many magnitudes greater than the amount of money devoted to problem gambling prevention and treatment. For example, the province of Ontario is reputed to spend more money on prevention, treatment, and research than any other jurisdiction in the world, amounting to \$36 million in 2003/2004 (Sadinsky, 2005). However, in this same year, the Ontario Lottery and Gaming Corporation’s budget for marketing, advertising, and promotions was over \$570 million. This amount did not include the additional advertising budgets of the three commercial casinos, which were estimated to exceed \$200 million. Consequently, it is the rare Ontario resident who is unaware of the omnipresent lottery and casino advertisements on television, radio, print media, and along public roadways. On the other hand, most Ontario residents are unaware of the province’s ‘responsible gambling’ initiatives (Turner, Wiebe, Falkowski-Ham, et al., 2005).

The nature of gambling advertising is also of concern, as some of it is clearly misleading. Typical examples are lottery advertisements that suggest the chances of winning are better than they actually are, or that a person’s overall wellbeing will be substantially better after winning a jackpot (Griffiths, 2005b; Korn, Hurson, and Reynolds, 2005; McMullan & Miller, 2008, 2009a, 2009b). Many lotteries also have websites that provide players with information about the frequencies of winning lottery numbers, which deceptively conveys the impression that useful information might be gleaned from this data. There has also been an increasing usage of phrases such as ‘responsible gaming’, as opposed to ‘responsible gambling’. Indeed, a Google search shows the former to now be the more commonly used term. Similarly, engagement in gambling is typically described as ‘play’ (e.g., ‘playing slot machines’). This is potentially problematic. Portraying your product as more benign than it actually is undermines efforts of alerting people to their over-involvement in it.

An additional concern is that some of this advertising appears to be directed at underage youth (Derevensky, 2008; Friend & Ladd, 2009; Korn, Hurson, & Reynolds, 2005; Monaghan, Derevensky, & Sklar, 2008).

In general, the actual impact of advertising on consumer behaviour is complex and not well understood. What is clear is that the impact is dependent on many factors, including the quality and nature of the advertising, the nature of the product, the newness of the product to the marketplace, the nature of consumer, and the familiarity of the consumer with the type of product (Binde, 2007; Kim, 1992). A fair bit of research exists on the impact of alcohol and tobacco advertising, and generally indicates that advertising has some influence on market share, but little effect on overall consumption levels (Boddewyn, 1994; Duffy, 1996; Fisher, 1993; Nelson, 2001; Smart, 1988). Within these findings, however, there are some important subgroup effects. Recovered alcoholics, for example, commonly report that alcohol advertising is a significant trigger for relapse (Treise, Taylor & Wells, 1994). Second, longitudinal research in youth has found a relationship between exposure to tobacco or alcohol advertising and subsequent use of these substances (Anderson et al., 2009; Babor, Caetano, Casswell, et al., 2010; Ellickson, Collins, Hambarsoomians, & McCaffrey, 2005; Lovato, Linn, Stead, & Best, 2003). Furthermore, Weiss et al. (2006) found that anti-tobacco advertising was typically insufficient to counteract the effects of this pro-tobacco advertising.

Relatively little research exists on the effects of gambling advertising on gambling behaviour (Binde, 2007; Griffiths, 2005b). It is reasonable to speculate that gambling advertising may have helped contribute to the positive attitudes toward gambling and increased participation in gambling when it was first widely introduced (Binde, 2007). However, despite continuous high levels of advertising, attitudes toward gambling are gradually becoming more negative (Smith et al., 2011) and the prevalence of gambling and problem gambling is stable or decreasing in most Western jurisdictions (Williams, Volberg, & Stevens, 2012).

Several studies have found that people who engage in gambling have a better recall of gambling advertising (e.g., Amey, 2001; Hani, 2008). However, this could simply be due to the fact that people with interest and involvement in any product typically have better attentiveness and recollection of information relevant to it.

Several studies have found that advertising has *some* impact on *intention* to gamble. Lee, Lemanski, & Jun (2008) found that in a sample of 229 undergraduate students that media exposure to gambling influenced both gambling attitudes and gambling intentions, and that the direction of the effect was dependent on whether the message was positive or negative. This same study found that anti-gambling media exposure was insufficient to counteract the effects of pro-gambling media exposure. Felsher, Derevensky, & Gupta (2004) found that, among Canadian youth between 10 and 18, of the 90% who reported recalling lottery advertising, that 39% thought it would influence them to buy lottery tickets. In a qualitative study, Derevensky (2008) found that 38% of youth ages 12 to 19 ( $n = 143$ ) in Quebec reported that gambling advertisements affected both their perceptions of gambling (e.g., gambling can make you rich, winning is easy) and their desire to gamble, with this impact primarily occurring in individuals who already gambled or had an established interest in gambling (i.e., males, older youth, and problem gamblers). Similar findings were obtained in a follow-up quantitative study of 1,147 Quebec youth (Derevensky, Sklar, Gupta, & Messerlian, 2010).

The finding that gambling advertisements may have greater impact on propensity to gamble among people who are problem gamblers was also found by Grant & Kim (2001), who reported that 46% of a sample of 131 pathological gamblers indicated that advertising was a trigger (Grant & Kim, 2001). Twenty percent of female gamblers from Ontario with concerns about their gambling reported that 'exposure to ads on TV, billboards and newspapers' was 'very' or 'extremely' important in creating urges and temptations to gamble (Boughton & Brewster, 2002). Similar findings have been reported in a couple of Swedish studies (Binde, 2007, 2009; Jonsson et al., 2003) (although the large majority of problem gamblers in the Jonsson et al. study reported almost no influence of advertising on their behaviour).

In a fair summary of the evidence, Binde (2007) concludes that pro-gambling advertising probably does have a small short-term impact on problem gambling, but with a magnitude much smaller than other causal factors. The mechanism of this impact is largely through a) the recruitment of new players for new games in an immature market (e.g., Internet poker), a small percentage of whom will go on to become problem gamblers, b) intensifying gambling behaviour in a portion of regular gamblers, and c) increasing the propensity for relapse in among existing problem gamblers.

### Gambling Venue Design

When choosing among commercial venues, customers will always preferentially patronize establishments that are more attractive and that offer a greater range of products and services. The same is true for casinos (Friedman, 2000). It is also self-evident that people will tend stay longer in more pleasant surroundings and thereby, potentially spend more (Mayer & Johnson, 2003). Consequently, there is a fair amount of research to identify the types of casino environment that patrons prefer (e.g., Johnson, Mayer & Champaner, 2004; Lam et al., 2011; Lucas, 2003; Mayer, Johnson, Hu, & Chen, 1998).

However, beyond these basic tenets of consumer behaviour, the issue is whether there are additional design elements of gambling venues that increase gambling time and/or expenditure. As discussed in the EGM Parameters section, providing comfortable seating, increased privacy, and low machine lighting are features that appear to facilitate EGM play. Specific *casino* design elements that people have speculated may be related to continued play are the lack of windows, absence of clocks, maze-like interiors, low ambient lighting punctuated by the bright colorful lights of EGMs, and the constant background noise of EGMs, particularly the sounds of winning (there is no sound of losing) (Griffiths, 2009). Subjectively, many gamblers believe that these design characteristics do promote different patterns of play (e.g., Finlay, Marmurek, Kanetkar, & Londerville, 2007; Griffiths & Parke, 2003; Marmurek, Finlay, Kanetkar & Londerville, 2007), and that alteration of these features would be useful harm minimization strategies (Caraniche Pty Ltd., 2005; Hing, 2003). Some jurisdictions mandate that venues have clocks and/or proper lighting (i.e., certain states in Australia; Australian DFHCSIA, 2012) and that EGMs are inactive when not being played (e.g., Netherlands, Spain; Gourdriaan, de Bruin, & Koeter, 2009; Becona, 2009).

However, there is very little research on whether gambling *behaviour* is actually altered as a function of casino environment, and no research on whether these things facilitate *excessive* gambling behaviour. The presence of a certain aroma was associated with higher amounts spent on slot machines in a Las Vegas casino compared to a different aroma and no odor at all (Hirsh, 1995). The presence of music and the type of music played had no impact on bet size or amount spent in a laboratory-based roulette game (Dixon, Trigg & Griffiths, 2007). However, a faster music tempo was associated with a faster speed of betting. A similar finding was obtained by Spennyn, Barrett, & Griffiths (2010) where fast tempo music under red lighting was found to increase speed of bets (but not amount bet) in an online version of roulette. Other research has also found tentative evidence that people gamble more under red lighting (Griffiths & Swift, 1992; Stark, Saunders, & Wookey, 1982).

However, even if it were well established that these elements promoted gambling behaviour among *current* gamblers, a plausible mechanism might be their prior conditioned association to gambling, as lights and sounds are very salient, easily conditionable stimuli (i.e., a stronger case is made if these effects can be demonstrated in novice gamblers). The final observation relevant to the issue of the impact of gambling venue design is that EGMs have no difficulty generating significant revenues across a myriad of environments, including convenience stores, bars, clubs, hotels, arcades, restaurants, racetracks, and boats. Thus, while certain environmental features of gambling venues may facilitate time and money spent gambling, it seems unlikely they are powerful factors.

### Increasing the Cost of Gambling

Increasing the cost of alcohol and tobacco (through taxation) is one of the most effective policies to reduce alcohol and tobacco use and abuse (e.g., Babor, Caetano, Casswell, et al., 2003; Cnossen, 2005; Cook, 2007; Wagenaar, Salois, & Komro, 2009). However, it is unclear whether increasing the cost of legal gambling would effectively deter problem gambling (Clotfelter, 2005). Substantial economic ‘costs’ are already built into gambling products. Moreover, population participation in gambling is inversely related to the payback rate: the highest patronage is for lotteries and instant win tickets, which offer the lowest payback rate, and there is comparatively low patronage of casino table games and sports betting which have higher payback rates. Variation of payback rates within a particular gambling format (e.g., roulette, sports betting), does sometimes influence spending on that format (i.e., lower spending on variants providing lower payback rates) (Harvey, Swayze, Walls, 2004; Paton, Siegel, Vaughan-Williams, 2004). That said, a general review of this literature by Parke (2010) found very little empirical evidence that payback percentage was an important feature of gambling behaviour or related to the development of problem gambling.

However, it is important to recognize that when consumers purchase a product their perception of cost has more to do with the initial ‘sticker price’ relative to the perceived value of the product. Applied to gambling, this explains why there is a preference for cheaper lottery

tickets (e.g., Turner & Ferentzy, 2010), lower denomination EGMs (Schwartz, 2010), and larger jackpots (e.g., DeBoer, 1990; Forrest, Perez, & Baker, 2010; Garrett & Sobel, 2004; Turner & Ferentzy, 2010). Hence, the minimum bet size relative to the maximum win size will generally be more important to the gambler than the overall payback percentage or actual odds of winning. (People who are knowledgeable and concerned about payback percentage and odds tend to avoid commercial gambling in the first place). Accordingly, raising the minimum bet size and lowering the maximum win size are likely to have the greatest potential for harm minimization.

## Government Provision of Gambling

There is wide divergence concerning how gambling is provided and who provides it. There are four basic approaches:

- A free market approach that allows private commercial operators to provide gambling services in a manner similar to other commercial products (although sometimes taxed at a much higher rate).
- Restricting the provision of gambling to one or two government-owned or government-controlled providers.
- Restricting the provision of gambling to private monopolies.
- Having a mixture of government controlled monopolies and private commercial offerings.

The free market approach tends to be favoured in jurisdictions such as the United States and Australia, whereas the remaining approaches are more common in places such as Canada and Europe. There is also significant variability as a function of game type. In most countries it is common for lotteries and lottery products to be delivered by government-controlled monopolies, whereas government involvement is rare in the delivery of horse racing or bingo. Casino delivery is quite variable. In the United States they are provided by private operators, whereas in several European countries only a public operator or an operator closely supervised by the State can manage a casino (Germany, Greece, Finland, Hungary, the Netherlands, Sweden, and Slovenia).

Essentially, the main issues are whether gambling a) should be provided by the government or private commercial provider(s), and b) whether it should be provided by a single entity (monopoly) or multiple providers. An extensive literature exists on the benefits and drawbacks of each of these approaches in the delivery of various consumer products. It is beyond the scope of this paper to provide a review of this more generic literature. However, it is worthwhile to at least identify the main issues as they relate to problem gambling.

A conflict of interest exists when government adopts the role of both the regulator and provider of gambling or when the government is a major financial beneficiary of gambling. This conflict of interest potentially compromises the regulator's ability to implement truly effective prevention policies, and to effectively regulate the operator. Effective prevention and

treatment will typically negatively impact revenues, introducing a policy conflict between the protection of public health and the maximization of gambling revenues (Adams, Raeburn, & de Silva, 2009; Orford, 2009).

The actual effects of this conflict of interest are difficult to determine, as this situation tends to be confounded with other things. Many of the jurisdictions where government is the provider of gambling and/or receives a significant portion of the revenue (e.g., Canada, several European countries) are involved in gambling ostensibly to provide a safer and more controlled product to the public. With this greater concern for public welfare, these governments also tend to offer more in the way of problem gambling prevention and treatment initiatives. That being said, a) the creation of these initiatives is partly spurred on by their sensitivity to this conflict of interest criticism, and b) the initiatives that most of these governments have chosen to implement have tended to be the least effective ones<sup>42</sup>. In contrast, jurisdictions where the government is primarily involved in the regulation rather than provision of gambling (e.g. United States, Australia), tend to have less in the way of protective measures, as these governments put more responsibility on the individual to govern their own behaviour. The power of the gambling lobby/industry is also much stronger in these types of countries and often deters the adoption of protective measures (Grinols, 2004; Kindt, 1998).

There are also some important lessons from the alcohol field, where the evidence suggests that monopolistic and/or government involvement in alcohol provision is associated with less harm to the public (e.g., Miller, Snowden, Birckmayer, & Hendrie, 2006; Popova et al., 2011; Wagenaar & Holder, 1996). However, these data are largely correlational, and therefore subjects to similar confounds as mentioned above. A stronger methodology involves examining the effects of privatizing alcohol sales in jurisdictions where government monopolies previously existed. Privatization has occurred in several U.S. states (Idaho, Iowa, Maine, Virginia, Washington, West Virginia), 3 Canadian provinces (Alberta, British Columbia, Quebec), and certain countries (New Zealand), although in some cases it just involved elimination of certain types of alcohol provision (e.g., retail wine monopoly), and in some cases there were still restrictions on private retail (e.g., no provision in grocery stores). Nonetheless, research has generally found that privatization is associated with an increase in the number of retail outlets, longer opening hours, and *increases in overall alcohol consumption* (with overall consumption level having a statistical relationship to overall level of harm) (Holder, Agardh, Hogberg, et al., 2008; Stockwell et al., 2009; Wagenaar & Holder, 1995; 1996; cf. Trollidal, 2005).

Hence, although theoretically sound, in practice, eliminating or constraining government involvement in the provision of gambling may not achieve the desired effect. In lieu of this, another solution is to enact legislation that targets this conflict of interest or that requires gambling providers (government or otherwise) to effectively mitigate the harm from the provision of gambling. While it is true that many jurisdictions have legislation requiring gambling providers to provide gambling responsibly, only a few have enacted specific

---

<sup>42</sup> Most of these initiatives have focused on the fairly weak strategy of better education of consumers as opposed to more effective policy initiatives that constrain the availability of gambling and how it is provided.

legislation to ensure this result. A notable exception is Germany, which has enacted legislation that among other things a) prohibits the pay of gambling provider executives to be tied to gambling revenue; b) requires that the monitoring of compliance with gambling regulations to be done by authorities not connected to the fiscal interests of the state; c) requires all new gambling products to be reviewed by an advisory board of gambling addiction experts prior to introduction; and d) requires gambling providers to detect and exclude problem gamblers from gambling venues (Meyer & Hayer, 2009).



## SUMMARY OF THE EFFECTIVENESS OF EDUCATIONAL AND POLICY INITIATIVES

The following general themes arise from the evidence that has been reviewed to this point.

1. First, a very large number of different prevention initiatives exist. This reflects the many different jurisdictional approaches to problem gambling, the considerable interest and effort that is being put into mitigating gambling's harm, and the large number of ways in which gambling behaviour can be potentially influenced.
2. Some jurisdictions have little or no prevention strategies, whereas others have an extensive array. There is tendency for more socially progressive jurisdictions to also have more progressive and effective prevention strategies (which makes inter-jurisdictional comparisons of the effectiveness of different policies difficult).
3. There are a few initiatives where almost no direct evidence exists concerning their efficacy, many initiatives where some direct evidence exists, and a small number of initiatives where extensive evidence exists. That being said, most of these initiatives have analogues in allied health fields that have been thoroughly researched.
4. While certain initiatives are more effective than others, there is almost nothing that is not helpful to some extent and, conversely, there is almost nothing that by itself has substantial potential to prevent harm.
5. The most commonly adopted prevention measures tend to be among the least effective ones (e.g., awareness/information campaigns, responsible gambling features on EGMs, casino self-exclusion, etc.). Furthermore, when potentially more effective initiatives are implemented, they are typically done in such an inconsequential or perfunctory fashion as to virtually ensure lack of impact (e.g., small reductions in number of gambling venues or numbers of EGMs, minor restrictions on access to money, etc.).

Table 6 summarizes the evidence concerning the demonstrated or estimated effectiveness of various educational and policy initiatives to prevent problem gambling.

Table 6. Estimated Effectiveness of Problem Gambling Prevention Initiatives.

	high	moderately high	moderate	moderately low	low
<b>EDUCATIONAL INITIATIVES</b>			✓		
Childhood Interventions		✓			
Information/Awareness Campaigns				✓	
On-Site Information/Counselling Centres (RGIC)				✓	
Statistical Instruction				✓	
School-Based Prevention Programs			?		
<b>POLICY INITIATIVES</b>			✓		
Restrictions on the General Availability of Gambling		✓ <sup>1</sup>			
Restricting the Number of Gambling Venues (casinos/racinos)		✓ <sup>1</sup>			
Restricting More Harmful Types of Gambling		✓ <sup>1</sup>			
Limiting the Number of Gambling Formats			?		
Restricting Gambling to Dedicated Gambling Venues			?		
Restricting the Location of Gambling Venues		✓			
Limiting Gambling Venue Hours of Operation				?? <sup>2</sup>	
Restrictions on Who can Gamble			?		
Prohibition of Youth Gambling			?? <sup>3</sup>		
Increasing the Legal Age for Gambling			✓		
Restricting Venue Entry to Non-Residents		?? <sup>4</sup>			
Restricting Venue Entry to Higher Socioeconomic Classes			?		
Casino Self-Exclusion				✓ <sup>5</sup>	
Restrictions or Alterations on How Gambling is Provided			✓		
Modifying EGM Parameters				✓ <sup>6</sup>	
Player Pre-Commitment			✓ <sup>7</sup>		
Eliminating Reward/Loyalty Cards or Changing Their Parameters			?		
Operator Imposed Maximum Loss Limits		?			
Problem Gambling Training for Employees of Gambling Venues				✓ <sup>8</sup>	
Automated or Mandated Intervention for At-Risk Gamblers			✓		
Restricting Access to Money			?		
Restricting Concurrent use of Alcohol and Tobacco		✓			
Restricting Advertising				✓ <sup>9</sup>	
Gambling Venue Design					?
Increasing the Cost of Gambling				?? <sup>10</sup>	
Government Provision of Gambling			✓		

1. If the reductions are substantial.
2. Unless the time reduction is substantial.
3. A more effective strategy might be to model responsible gambling to youth prior to the legal gambling age.
4. Prevention benefits are limited to residents rather than non-residents.
5. Even with effective detection mechanisms, this initiative has limited preventive value because of its tertiary nature.
6. Decreasing maximum bet and win size, slower speed, reducing frequency of near misses, reducing number of betting lines, eliminating bill acceptors, reducing their interactive nature, presenting pop-up messages, and absence of seating.
7. Only if mandatory. Also more effective if irrevocable, applicable to all EGMs or all gambling in a jurisdiction, with non-swappable ID.
8. The value of this measure may be increased if staff intervention is mandatory and compliance is enforced.
9. More important for preventing relapse in problem gamblers and preventing involvement in gambling among young people.
10. Greater harm minimization potential with raising minimum bet size and lowering maximum prize size.

Note. Question mark (?) indicates uncertainty due to insufficient evidence.

# BEST PRACTICES TO PREVENT PROBLEM GAMBLING

The foregoing summary indicates some level of positive empirical support for a number of prevention initiatives. The purpose of the present section is to provide more direct guidance about the most effective strategies that would constitute ‘best practices’ for the prevention of problem gambling. Some might contend that it is premature to identify best practices without a stronger base of direct evidence. We respond that, it is not only possible to speculate on best practices, it is *necessary* that this speculation occur. As has been seen, dozens of prevention initiatives have already been implemented in hundreds of jurisdictions around the world. People are not waiting for ‘all the evidence to be in’. Unfortunately, history tells us that once a prevention program (or treatment program) becomes established, it often becomes very difficult to supersede it, even when more effective alternatives become available. This is the situation found in the substance abuse field, where the most commonly used (and entrenched) educational initiatives for prevention and treatment tend to be the less effective ones (Babor, Caetano, Casswell, et al, 2010; Miller, Wilbourne & Hettema, 2003; Tobler et al., 2000).

## **BEST PRACTICE 1: Strive for Optimal Design and Evaluation of New Initiatives.**

### **1.1 Employ Social Scientists in the Design, Implementation, and Evaluation.**

The inspiration, design, and implementation of almost all existing problem gambling prevention initiatives have primarily been led by people from government and the gambling industry without backgrounds in either prevention or the social sciences. When social scientists have been utilized, they are usually confined just to the evaluation of these initiatives. Undoubtedly, this is an important contributing factor to why many of the existing problem gambling prevention initiatives have tended to be fairly ineffective.

### **1.2 Use Proven Theoretical Models of Behavioural Change to Guide the Development of New Initiatives.**

It is difficult to change people’s behaviour. However, there are some well established theories that are able to predict when an initiative is likely to be successful in causing people to take action (Noar & Zimmerman, 2005). These include the Theory of Planned Behaviour (Ajzen & Madden, 1986); the Transtheoretical Model (Prochaska, DiClemente, & Norcross, 1992); and the Health Beliefs Model (Becker, 1974; Janz et al., 2002). The Health Beliefs Model, in particular, is very clear about the circumstances that cause people to change their behaviour: when the information being communicated is personally relevant; when the consequences of not changing behaviour are potentially severe; when the benefits of adopting the behaviour are quite beneficial; when the person perceives that the behavioural change required is relatively easy for them to achieve; and when the person receives plenty of cues for action.

### **1.3 Always use Behavioural Change as the Primary Measure of Effectiveness.**

The best measure of actual effectiveness will always be empirical evidence that the initiative reduces the number of new cases of problem gambling in the population (i.e., incidence). Admittedly, this type of evidence is difficult to obtain as it requires follow up of large group of individuals over an extended period of time. In lieu of measuring incidence, there needs to be focus on meaningful behavioural change within the individual as the measure of effectiveness. Improvements in awareness, knowledge or attitudes are of value as intermediate steps in the right direction, but of very limited importance if not accompanied by behavioural change. Similarly, the perceptions or opinions of at-risk gamblers toward a particular prevention policy is useful information, but is never a substitute for actual changes in behaviour. 'Knowing something' and 'doing something about it' are always two different things, particularly in the field of addictions.

### **1.4. Conduct Regular Population Assessments of Problem Gambling to Monitor the Impact of New Initiatives.**

Regular evaluations of overall population prevalence of problem gambling is an important and efficient way to gauge the impact of the array of different initiatives that are typically implemented in the same time period. Annual jurisdiction-wide treatment numbers is another useful statistic.

## **BEST PRACTICE 2: Recognize that Effective Problem Gambling Prevention requires Decreased Revenue and some Inconvenience to Non-Problem Gamblers.**

As indicated earlier, the most commonly implemented prevention initiatives have also tended to be the least effective ones. Furthermore, when potentially more effective measures are implemented (e.g., reducing number of EGMs, reduced venue hours, etc.), the reductions have been too minor to have a significant impact. What this reflects is the fact that policy makers have an *unrealistic desire to implement effective prevention policies that do not inconvenience non-problem gamblers or reduce revenues*. Unfortunately, the reality is that the effective prevention of problem gambling is *only likely to occur* with some level of inconvenience to non-problem gamblers and necessarily involves a loss of revenue because of the significant contribution problem gamblers make to overall gambling revenue (Williams & Wood, 2004, 2007a).

The effective prevention of harm associated with potentially dangerous products or activities has always required some inconvenience to the general public and loss of revenue. The general public accepts the fact that aggressive government policies restricting tobacco advertising and consumption have resulted in reduced tax revenue. The general public also accepts the legal restrictions on their unfettered right to own firearms (e.g., restricted access to handguns and automatic weapons), to operate motor vehicles (e.g., need a driving license; mandatory seat belt use; speed limits), and to consume alcohol (e.g., not while driving, only in licensed establishments) despite the fact these restrictions are only really needed for a small minority of people with potential to misuse these products. These are the sorts of limitations that citizens routinely and willingly accept to produce a safer and healthier society overall.

### **2.1. The Goal of Harm Minimization has to be Given Equal Priority to Revenue Generation.**

Although many jurisdictions ascribe to these joint goals, very few of them actually achieve it. Most governments with these conflictual goals still have a predominantly commercial orientation, with their 'social responsibility' departments having relatively modest influence over overall policy direction. Countries that have enacted legislation that specifically requires gambling venues to detect and deter problem gambling (e.g., Germany, Switzerland) and/or prohibit the pay of gambling operator executives to be tied to gambling revenue (e.g., Germany) have more effectively balanced these goals.

### **BEST PRACTICE 3: Employ a Wide Array of Educational and Policy Initiatives.**

Table 6 indicates that there is almost nothing that is not helpful to some extent and, conversely, there is almost nothing that by itself has huge potential to prevent harm. There is no ‘magic bullet’ to prevent problem gambling. Even total prohibition would likely only have a moderately positive impact, with some offsetting negative consequences. Similarly, even the less effective initiatives may change the behaviour of a few individuals, lay the foundations for later behaviour change, or contribute to the effectiveness of other initiatives. The only caveat to this ‘everything is helpful’ notion concerns situations where the presence of weak initiatives is deemed sufficient, thereby impeding the adoption of more effective ones. *This is a very major caveat which applies to many jurisdictions at the current time.*

The biopsychosocial approach makes it clear that all addictive behaviour, including problem gambling, develops through a complex interaction between many different endogenous attributes and exogenous stimuli with there being a multitude of different risk factors. Effective prevention of alcohol abuse, for example, has required extensive and pervasive educational and policy initiatives directed at the individual, group and community level (Holder, 2005; Jackson, Geddes, Haw, & Frank, 2012; Slater et al., 2005; Winters et al., 2007). Arguably, the need for comprehensive educational and policy efforts is even greater for problem gambling, as the age of onset tends to be broad in range, not circumscribed to early adolescence as is commonly seen in substance abuse.<sup>43</sup>

#### **3.1. Recognize that Policy Measures are Equally, if not More Important, than Educational Initiatives.**

Within the gambling field, sentiments are sometimes expressed that external controls are inferior strategies (e.g., Napolitano, 2003) or that the primary emphasis should be placed on educating gamblers so they can make ‘informed choices’ (e.g., Blaszczynski et al., 2004; Blaszczynski et al., 2008; Blaszczynski et al., 2011).

However, jurisdictional approaches to reducing the harm from tobacco, alcohol, motor vehicles, etc. consistently give equal if not higher priority to policy initiatives (i.e., restricting access and operation), so it is unclear why gambling should be limited to just educational initiatives. Furthermore, research indicates that educational strategies tend to have limited ability to prevent addictive behaviour, and that meaningful policy measures are usually more effective.<sup>44</sup> For example, in the substance abuse field a) restrictions on the physical and economic availability of alcohol have been far more effective than educational campaigns in preventing alcohol-related harm (Babor, Caetano, Casswell, et al., 2010; Giesbrecht, 2007; Toumbourou, Stockwell, Neighbors, et al., 2007); b) contingency management approaches in treatment tend to be more effective than counselling (Higgins, Silverman, & Heil, 2007; Prendergast, Podus,

---

<sup>43</sup> This broad range of age onset for problem gambling may narrow with increased time and continued exposure to gambling opportunities.

<sup>44</sup> One of the reasons that policy measures tend to be more effective is because of their enduring nature. Educational initiatives tend to be short-term in duration, and consequently, short-term in their effects.

Finney, Greenwell, & Roll, 2006); and c) mandated treatment is often as effective as voluntary treatment (Klag, O'Callaghan, & Creed, 2005; Miller & Flaherty, 2002; Stevens et al., 2005; Wild, Roberts, & Cooper, 2002).<sup>45</sup>

By the same token, the role of education should not be too strongly discounted (e.g., Giesbrecht, 2007) based on its limited effectiveness in awareness campaigns and school-based programs. It is important to remember that a) education and knowledge provides the intellectual context for policy initiatives and likely contributes to their effectiveness (it is not possible to separate out its unique contribution); b) there are some situations in which educational strategies more reliably work (i.e., better quality school-based programs; circumstances outlined in the Health Belief Model; in the context of community mobilization approaches (see below)); c) school-based smoking prevention programs may have beneficial effect over the lifetime of the participants even if they have no apparent effect at school-leaving age (Jit, 2010); d) erroneous beliefs about gambling are arguably much more common than erroneous beliefs about drugs or alcohol and may well be more directly linked to gambling behaviour than erroneous beliefs about drugs and alcohol being linked to substance use; e) knowledge is often the stated reason for noninvolvement or minimal involvement in activities such as substance use or gambling; f) treatment works, and most treatment requires a very deliberate and conscious effort to change behaviour based on what the person has learned about themselves and addictive behaviour more generally.

---

<sup>45</sup> With regards to mandatory treatment, what people often fail to remember is that everyone who 'voluntarily' presents to treatment has an external reason that motivated them to come (i.e., if they do not change they will lose their spouse, family, health, employment, or freedom). While motivation is essential in therapeutic change, the internal versus external origin of this motivation tends to be less important.



## **BEST PRACTICE 4: Coordinate these Multiple Educational and Policy Initiatives.**

Evidence from allied fields demonstrates that effective prevention requires *coordination* between a wide range of effective educational strategies and effective policy measures targeting the same outcomes. Multiple prongs within a comprehensive and coordinated prevention strategy are often synergistic, with overlapping initiatives reinforcing the message and power of individual components (Nation et al., 2003; Stockwell et al., 2005). *The effect is analogous to a shotgun blast, where the effect of any individual pellet is negligible, but when combined with other pellets aimed at the same target, can collectively have a major impact.* To ensure synergistic coordination, it is often preferable to implement initiatives simultaneously rather than sequentially. The greater effectiveness of these more pervasive approaches has been demonstrated both in primary prevention (Durlak & Wells, 1997; and in the treatment of addictive behaviours (Miller, Wilbourne, & Hetteema, 2003).

It is equally important to ensure that the same core messages are contained across all initiatives. Moreover, educational or policy measures that are misaligned or opposed may negate or even reverse any intended positive impact. For example, educational messages to “stay within your limit” are undermined by policies that allow ATMs to be placed in close proximity to slot machines, or with loyalty programs that escalate rewards (‘comps’) as losses mount. Furthermore, if the prevention message is that gambling or certain gambling practices is/are potentially dangerous, then it is inconsistent to describe gambling as ‘gaming’, and for commercial advertising to exclusively emphasize how much fun it is and how a big win will improve a person’s quality of life.

### **4.1 Try to Involve the Local Community in the Implementation of these Multiple Initiatives.**

Comprehensive approaches that involve mobilizing the entire community tend to be more effective than outside-imposed approaches as it produces more ‘buy-in’ and more people actually involved in implementation and enforcement (Allaman et al., 2000; Casswell, 2000; Holder, Saltz, Grube, et al., 1997; Spinks, Turner, Nixon, & McClure, 2005; Stewart & Casswell, 1993; Toumbourou, 1999; cf. Secker-Walker, Gnich, Platt, & Lancaster, 2002). While the nature and choice of the initiatives should be largely guided by scientific research, the local community is often in a better position to know how to operationalize and enforce these strategies.

## **BEST PRACTICE 5: Decrease the General Availability of Gambling.**

While many factors contribute to gambling participation and the onset of gambling problems, some factors have a stronger relationship than others. Interventions that target these stronger factors are essential components of an overall strategy to prevent problem gambling. One of the more important factors is the overall availability and access to gambling. The strength of the relationship between gambling availability and problem gambling has weakened in the past decade, presumably because ongoing exposure to gambling has helped inoculate the population to the harmful effects (Shaffer et al., 2004; LaPlante & Shaffer, 2007; Williams, Volberg, & Stevens, 2012). Nonetheless, gambling availability continues to be an important contributing factor to problem gambling, particularly for young people who have not had prior exposure, for jurisdictions without extensive prior exposure, and with the introduction of any new form of gambling. While there are a number of ways to achieve lowered gambling availability, those with the greatest empirical support include the following:

### **5.1 Limit or Reduce the Number of Gambling Venues.**

There is a positive association between the number of gambling venues per capita (particularly casinos and slot machine venues) and the prevalence of problem gambling. Furthermore, the causal direction of this relationship is well established from the increase in problem gambling prevalence that typically follows the introduction of new venues. It must be noted that the effectiveness of reducing the number of gambling venues is severely compromised if offset by an increased number of EGMs per venue.

### **5.2 Limit or Reduce the Number of Different Forms of Gambling.**

The number of gambling formats a person engages in is a stronger predictor of problem gambling status than is the particular gambling format that is favoured.

### **5.3 Locate Gambling Venues away from Vulnerable Populations.**

Individual pre-existing vulnerability to addiction is a strong (perhaps the strongest) determinant of problem gambling. Within most jurisdictions, the greatest preponderance of people with vulnerable attributes (i.e., other addictions, mental health problems, young people) is found in neighbourhoods of lower socioeconomic status. Thus, new venues should not be placed in these types of neighbourhoods.

Placing gambling venues in tourist destinations away from major urban centres provides a further safeguard for the local populace, as well as resulting in much better economic benefit because of the out-of-jurisdiction source of the revenue. Although this strategy partly just shifts the harm to out-of-jurisdiction residents, the actual impact on tourists will be less, as most of these individuals will not be able to regularly patronize the facilities they are visiting, and people with the financial means to travel may have somewhat less personal vulnerability to gambling addiction.

#### 5.4 Implement Other Restrictions on Gambling Availability.

Several other approaches aimed at reducing gambling availability have the theoretical potential (but little or no existing empirical support) to contribute to an overall problem gambling prevention strategy. A fairly radical strategy utilized on a limited basis around the world involves **restricting gambling venue access to non-residents, or drastically limiting the number of gambling venues accessible by residents.**

Another method with theoretical support is to **restrict gambling opportunities (especially EGMs) to dedicated gambling venues** rather than allowing additional placement in bars, restaurants, etc. This strategy is defeated, however, if the jurisdiction creates large numbers of gambling venues and distributes them widely among the population.

A final approach to reducing gambling availability involves **reducing venue hours of operation**, a policy measure demonstrated to be effective in reducing alcohol-related harm. The limited empirical support relative to problem gambling prevention may be attributable to the fairly minor reductions in hours of operation that have been implemented to date. Logically, limiting hours of operation targets gamblers whose duration of play is excessive.

## **BEST PRACTICE 6: Eliminate, Reduce, and/or Constrain Higher-Risk Forms of Gambling.**

The most dependency-prone form of gambling tends to be continuous forms with rapid game frequency. **EGMs, continuous lotteries, and casino table games** epitomize this feature. Eliminating or substantially reducing the numbers of these games would have significant preventative value.

**Internet gambling** is another form of gambling with higher addiction potential because of its 24 hour availability, provision of continuous forms of gambling, and high levels of privacy. It has less potential to cause population-wide changes in problem gambling rates compared to EGMs and other continuous forms of gambling because it tends to be a niche form of gambling that is not well patronized (i.e., although prevalence of Internet gambling has increased significantly since its inception 17 years ago, it is still among the least commonly patronized forms of gambling in most countries). Although prohibition is difficult to enforce, countries with this policy tend to have lower rates of Internet problem gambling relative to countries that have legalized it. To date, efforts to mitigate the harm of legalized Internet gambling (i.e., through pre-commitment, self-exclusion, and behaviour analytics) have had a modest impact due to the very small percentage of online sites that have adopted these practices as well as the revocable and short-term duration of most of these constraints (Griffiths, 2012; Williams, Wood & Parke, 2012b).

### **6.1 Constrain EGM Speed, Maximum Bet Size, Maximum Win Size, Frequency of Near Misses, Number of Play Lines, and Seating.**

To date, the considerable effort that has been put into modifying EGM parameters to reduce their dependency-forming impact has had very limited effect. However, strategies that impose 'hard limits' on expenditure, reinforcement frequency, privacy, and comfort have the best potential to minimize harm. (Eliminating bill acceptors also has this ability).

### **6.2 Require Pre-Commitment of Gambling Expenditure and/or Time on EGMs and Online gambling using Effective Parameters.**

Pre-commitment is a comparatively new harm minimization strategy that has significant potential for harm minimization. However, similar to other initiatives, it has usually been implemented using ineffectual parameters so as not to inconvenience non-problem gamblers or adversely affect overall revenue. The degree to which pre-commitment is voluntary, revocable, exceedable, of short duration, available for just some EGMs or some Internet sites, available for just some forms of gambling, and does not use biometric ID or some other form of identification that deters identity swapping, is the degree to which the utility of the technique is primarily limited to non-problem gamblers (which may or may not translate into a decreased future incidence of problem gambling). In contrast, the degree to which all avenues for excessive gambling have been closed, is the degree to which the technique likely has broader utility for problem and non-problem gamblers.

## **BEST PRACTICE 7: Eliminate Reward Cards or use them to Foster Responsible Gambling.**

*Traditional* Reward/Loyalty cards are incompatible with pre-commitment technologies, as the former rewards amount of play and the latter attempts to constrain amount of play. Thus, they should not be combined in the same card. Furthermore, in jurisdictions with a single gambling provider, there is no justification for Reward cards at all. Rewarding amount of consumption would never be tolerated for alcohol or tobacco, so it is unclear why this would be an acceptable practice for gambling.

However, Reward Cards have significant potential to promote responsible gambling if used to **reward responsible play**, rather than amount of play. For example, players could receive points up to a reasonable operator-set daily level of spending, beyond which they receive no points or start losing points. Another strategy would be for players not being able to collect their player points if they have exceeded their pre-commitment levels. Finally, players could receive points for opting to view educational resources.

There is also no reason why the behavioural data from Reward Cards should not be used to proactively alert players to 'at-risk' play. If for no other reason, operators having this knowledge and then failing to act on it creates potential legal liability from a 'duty of care' perspective.

## BEST PRACTICE 8: Restrict who is Eligible to Gamble.

Some people are considerably more prone to gambling addiction than other people (e.g, males; young adults; and people with pre-existing or prior addictions, mental health problems, and conducive personality traits). Furthermore, gambling addiction will have more adverse impacts for some people, and for society more generally, compared to other people (i.e., poor people; citizens of the jurisdiction compared to non-residents).

Societal and political constraints will limit the extent to which eligibility to gamble can be selectively applied. However, there can be no doubt about the potentially efficacy of such a targeted approach.

The only demographic where there is broadly applied (and accepted) ineligibility concerns prohibition of gambling for youth below the 'age of majority'. There are both pros and cons to this policy. One pro concerns the fact that adolescents may be neurologically more vulnerable to addictive products compared to adults, with long-term adult ramifications. Another pro concerns the fact that young adults inherently have the highest rates of 'at-risk' behaviour, so there is potential utility to delay exposing them to gambling for as long as possible. Further to this last point, it is almost certain that **raising the legal age for gambling** (which currently varies from 16 to 25 depending on the type of gambling and jurisdiction), would be a beneficial strategy to minimize gambling-related harm.

Prohibition of youth gambling has an important downside, which is that it limits the ability for extended modelling of responsible gambling (i.e., as extended modelling of responsible alcohol use as well as safe operation of a motor vehicle are both known to have significant long-term benefits in reducing harms associated with these products). The absence of healthy modelling undoubtedly contributes to the fact that the highest rates of problem gambling in most Western countries is in the 18-25 year old age group. Hence, modelling responsible gambling to youth prior to their unrestricted ability to gamble themselves would likely have value, as would a graduated ability to gamble independently.

**BEST PRACTICE 9: Restrict the Use of Tobacco and Alcohol While Gambling.**

Problem gamblers and people at risk for problem gambling are significantly more likely to smoke and to use/abuse alcohol than other people. Accordingly, policies to restrict the use of alcohol and tobacco while gambling have theoretical potential to contribute to a comprehensive preventive strategy. For example, requiring patrons to leave the gambling area to smoke or drink may encourage both gamblers and problem gamblers to take breaks from gambling. Moreover, making alcohol less accessible may reduce the proportion of people who gamble while their decisions are influenced by the disinhibiting effects of alcohol. This may be of particular value when patrons feel the impulse to continue gambling when they reach their limits.

**BEST PRACTICE 10: Restrict Access to Money While Gambling.**

Research findings (both anecdotal and from survey data) suggest that policies to restrict immediate access to cash (e.g., ATMs) are potentially effective approaches in reducing the degree to which gamblers exceed financial limits. This strategy may be especially significant when considering that gamblers are often in “hot” psychological states as they approach their limits, creating vulnerability to impulsive gambling continuation leading to money losses they cannot afford. The logic here is to create a time buffer between the impulse to obtain more money (the “hot” decision), and acting on the impulse. Thus, ATMs should not be in gambling venues.

A related measure is to prohibit gambling venues from offering lines of credit to gamblers. Credit policies do not provide cash with which to gamble; rather, they allow gamblers to accumulate losses up to a pre-negotiated limit. In light of the fact that, by definition, such policies require borrowing money to gamble, there appears to be no defensible rationale for casinos to offer credit to gamblers.



## **BEST PRACTICE 11: Impart Knowledge, Attitudes, and Skills to Gamblers to Inhibit the Progression to Problem Gambling.**

Many of the foregoing Best Practices can best be characterized as “policy measures”. In this sense, policies are official restrictions or controls on gambling that either promote the adoption of risky gambling practices or inhibit the adoption of these practices. In addition to policy measures, however, educational interventions intended to change internal knowledge, attitudes, beliefs, and skills are also important for the prevention of gambling problems.

As indicated in the biopsychosocial framework, a person’s knowledge about gambling and the psychological needs served by gambling are among the critical factors that influence both the decision to gamble and the progression to problem gambling. Accordingly, educational interventions with demonstrated ability to change and shape relevant knowledge, attitudes, skills, and practices should be widely offered. Principal settings and resources include primary and secondary schools, colleges/universities, gambling venues, community resources (public health and designated community educational agencies), direct mail (electronic and land-based), and the media (radio, television, the Internet, text messaging, posters, billboards, etc.).

### **11.1 Increase Knowledge of Gambling and Problem Gambling.**

The type of *knowledge* that is likely to contribute to prevention includes awareness of one’s own gambling profile and the associated risks of excessive involvement. Key knowledge gains need to be achieved in relation to:

1. The dependency-forming potential of gambling.
2. The signs/symptoms of impaired control/problem gambling.
3. The negative consequences that arise from problem gambling.
4. The true odds of various gambling games.
5. Normative levels of time and money allocations on gambling.<sup>46</sup>
6. Low risk limits or guidelines that predict problem-free gambling.
7. Gambling practices that increase the risk of impaired control and negative consequences.
8. Where to go for help.

This increased knowledge of gambling and problem gambling is particularly important for new gamblers. *An educational session for all new gamblers would be one way of accomplishing this.*

### **11.2 Correct Erroneous Cognitions.**

A particularly important sub-category of change to knowledge/beliefs is the correction of erroneous cognitions common to both gamblers and problem gamblers. Chief among gambling-related erroneous cognitions are the misunderstanding of the independence of random events (i.e., not appreciating the “reload” feature of each play), ignoring the law of large numbers and averages, belief that outcomes can be controlled or predicted, superstitious

---

<sup>46</sup> Normative feedback about alcohol use has been shown to decrease alcohol misuse in university and college students in some circumstances (Moreira, Smith, Foxcroft, 2009).

conditioning, and selective memory for wins. Other cognitive errors pertain to motives for gambling. Most common are beliefs that gambling is a valid approach to earning money, and that it is a benign way to seek respite from negative emotions and affect. Faulty cognitions establish an intellectual context or foundation upon which gamblers bet more than they planned or can afford. As such, they are important contributing factors in the development of impaired control, and should be targeted in any comprehensive approach to prevention.

A related strategy involves ensuring that such erroneous cognitions are not transmitted or reinforced while players gamble. For instance, certain structural features of EGMs (e.g., the showing of near misses, the use of stop buttons, and the visual dominance of winning symbols while reels are spinning) actively “disinform” players by encouraging them to embrace logical but erroneous perceptions from what they are seeing and experiencing. Reducing or eliminating game features and operating practices likely to foster the adoption of erroneous cognitions, constitutes an important best practice for the prevention of problem gambling.

### **11.3 Foster Appropriate Attitudes toward Gambling.**

The outcomes described in Sections 11.1 and 11.2 are intended to lay the ground work for developing complementary attitudes to further reduce the likelihood of adopting risky gambling practices. Research suggests that the following key attitudes should be considered as outcomes for educational interventions and initiatives:

- a. Gambling should only come from cash dedicated to leisure expenses that the player can afford to lose.
- b. Borrowed money should never be used to gamble.
- c. Financial, health and social problems associated with problem gambling can be serious and are worth avoiding.
- d. Adopting risky practices and cognitions increases the likelihood of becoming a problem gambler.
- e. Increasing benefits from Reward/Loyalty cards are a sign that gambling losses are escalating.

### **11.4 Foster Skills to Operationalize Behaviour Change.**

As mentioned, although increases in knowledge and shifts in attitudes may be necessary precursors, they do not ensure behavioural change. One important lesson from allied fields of prevention research is that even when knowledge and attitudinal change is achieved, attendant changes in actual behaviour are much less common. Similar constraints have been found in gambling research with respect to awareness campaigns directed at the general public.

A key to achieving behaviour change is to ensure that members of the target group identify and learn appropriate skills to assist them adopt and maintain the desired behaviour change. In this context, skills answer questions about *how* to apply knowledge and attitudes to the desired behavioural change, and how to overcome obstacles to such change. Some skills will be cognitive (i.e., cognitive coping or cognitive restructuring), others will be behavioural (i.e., behavioural coping), and others yet will involve changes to motivation.

## **BEST PRACTICE 12: Keep Prevention Initiatives in Place for a Sustained Period because Population-Wide Behavioural Change takes a Long Time.**

As indicated earlier, even where comprehensive approaches have been applied in allied fields, immediate effects on behaviour have sometimes been small, or absent. Tobacco use best illustrates this point. There was no dramatic reduction in tobacco use after prevention efforts began in the mid-1960s. Rather, a very slow but progressive decline has been seen over the past 50 years as educational efforts, policies, and public attitudes have coalesced and strengthened. Similar observations apply to the prolonged process of changing drinking practices and lowering the incidence of impaired driving.<sup>47</sup>

Prevention approaches appear to be mobilizing more quickly with gambling, so there is some possibility that reductions in problem gambling may occur more quickly. Valuable lessons have been learned in allied prevention fields, and there is reason to believe that cohesive strategies for the prevention of problem gambling will develop accordingly. This optimism suggests that the incidence of problem gambling may reduce over a condensed time frame, given the appropriate coalescence of effective educational resources, health-oriented policy, and political will. Indeed, there is already evidence of a systematic decline in problem gambling prevalence rates in the past 10 years (Williams, Volberg, & Stevens, 2012).

---

<sup>47</sup> Changes in behaviour at a population level are often reflective of changes in society's norms. Observed moderators are a three-way interaction among health-oriented policies, societal norms, and individual behaviour. In Canada, the National Alcohol Strategy Working Group (2007) has identified a "Culture of Moderation" as the underlying context for a comprehensive prevention strategy. The goal of policy and educational initiatives is to establish as a cultural norm that drinking is a legitimate adult choice, when done in moderation.

## REFERENCES

- Adams, P.J., Raeburn, J., de Silva, K. (2009). A question of balance: prioritizing public health responses to harm from gambling. *Addiction*, 104, 688-91.
- ACNielsen and ACGR 2003. *Evaluation of the 3-hour Shutdown of NSW Clubs*.  
<http://www.austgamingcouncil.org.au/images/pdf/eLibrary/1574.pdf>
- Agrawal, A. & Lynskey, M.T. (2008). Are there genetic influences on addiction: evidence from family, adoption and twin studies. *Addiction*, 103 (7), 1069-81.
- Ajdacic-Gross, V., Killias, M., Hepp, U., Gadola, E., Bopp, M., Lauber, C., et al. (2006). Changing times: A longitudinal analysis of international firearm suicide data. *American Journal of Public Health*, 96(10), 1752-1755.
- Ajzen, I., & Madden, T.J. (1986). Prediction of goal-directed behaviour: Attitudes, intentions, and perceived behavioural control. *Journal of Experimental Social Psychology*, 22, 453-474.
- Alberta Alcohol and Drug Abuse Commission. (2001). *Problem gambling: Information and services summary*. Edmonton, AB: Author.
- Alberta Gaming and Liquor Commission. (2007). *Casino and racing entertainment centre voluntary self-exclusion program evaluation: Final report*. St. Albert, Alberta: Author.
- Allcock, C., Blaszczynski, A., Dickerson, M., Earl, K., Haw, J., Ladouceur, R., Symond, P. (2002). *Current issues related to identifying the problem gambler in the gambling venue*. Melbourne, Australia: Australian Gaming Council.
- Alegria, A.A., Petry, N.M., Hasin, D.S., Liu, S-M., Grant, B.F., Blanco, C. (2009). Disordered gambling among racial and ethnic groups in the US: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *CNS Spectrums*, 14 (3), 132-142.
- Allamani, A., Casswell, S., Graham, K., Holder, H.D., Holmila, M., Larsson, S., Nygaard, P. (2000). Introduction: Community action research and the prevention of alcohol problems at the local level, *Substance Use and Misuse*, 35(1), 2000, 1–10.
- American Gaming Association. (2012). *Industry information [Fact sheet]: States with slots*. Retrieved January 5, 2012, from <http://www.americangaming.org/fact-sheets/states-slots>
- American Gaming Association (2012). *Casino Alcohol Policies*.  
<http://www.americangaming.org/industry-resources/research/fact-sheets/casino-alcohol-policies>
- Amey, B. (2001). *People's participation in and attitudes to gaming, 1985-2000: Final results of the 2000 survey*. Wellington, New Zealand: Department of Internal Affairs.
- Anderson, P., de Bruin, A., Angus, K., Gordon, R., Hastings, G. (2009). Impact of alcohol advertising and media exposure on adolescent alcohol use: A systematic review of longitudinal studies. *Alcohol & Alcoholism*, 44(3), 229-243.
- Armstrong, J. (2008). Gambling addict Graham Calvert loses court battle with William Hill. *Mirror.co.uk*. Retrieved March 13, 2008, from <http://www.mirror.co.uk/>
- Atkin, C.K. (1995). Survey and experimental research on effects of alcohol advertising. In S. E. Martin (Ed.), *The effects of the mass media on the use and abuse of alcohol* (pp. 39-68). NIAAA Research Monograph No. 28, NIH Publication No. 95-3743. Rockville, MD: National Institute on Alcohol Abuse and Alcoholism.

- Atlantic Lottery Corporation. (2006). *Relevant, ready, responsible and regulated: 2005-06 annual report and social responsibility review*.
- Australian Department of Families, Housing, Community Services and Indigenous Affairs (DFHCSEA) 2012). *A National Snapshot of Harm Minimisation Strategies*. <http://www.fahcsia.gov.au/our-responsibilities/communities-and-vulnerable-people/publications-articles/a-national-snapshot-of-harm-minimisation-strategies?HTML>
- Babor, T., Caetano, R., Casswell, S., Edwards, G., Giesbrecht, N., Graham, K., Grube, J., Hill, L., Holder, H., Homel, R., Livingston, M., Osterberg, E., Rehm, J., Room, R., & Rossow, I. (2010). *Alcohol: No ordinary commodity: Research and public policy (2<sup>nd</sup> Edition)*. Oxford: Oxford University Press.
- Babor, T., Caulkins, J., Edwards, G., Fischer, B., Foxcroft, D., Humphreys, K., Obot, I., Rehm, J., Reuter, P., Room, R., Rossow, I., & Strang, J. (2010). *Drug Policy and the Public Good*. Oxford: Oxford University Press.
- Bala, M., Strzeszynski, L., & Cahill, K. (2008). Mass media interventions for smoking cessation in adults. *Cochrane Database of Systematic Reviews 2008*, Issue 1.
- Baron, E., & Dickerson, M. (1999). Alcohol consumption and self-control of gambling behaviour. *Journal of Gambling Studies*, 15(1), 3-15.
- BC Centre for Social Responsibility (2011). *BCLC's Voluntary Self-Exclusion Program: Perceptions and Experiences of a Sample of Program Participants*. April 2011.
- Becker, M.H. (ed.). (1974). *Health Belief Model and Personal Health Behavior*. Thorofare, NJ: Slack.
- Becona, E. (2009). Spain. In G.Meyer et al. (eds), *Problem Gambling in Europe: Challenges, Prevention, and Interventions*. pp 281-298. Springer.
- Bell, L. (2004). *Using performance to engage youth*. Paper presented at the Responsible Gambling Council Symposium Perspectives on Prevention: A Symposium on Problem Gambling 2004, Toronto, Ontario.
- Benassi, V.A., & Knoth, R.L. (1993). The intractable conjunction fallacy: Statistical sophistication, instructional set, and training. *Journal of Social Behavior and Personality*, 8, 83-96.
- Bernhard, B.J., Lucas, A.F., Jang, D. (2006). *Responsible Gaming Device Research Report*. International Gaming institute. University of Nevada, Las Vegas.
- Bes, R. (2002). *Ten years of responsible gambling policy at Holland Casino: A study into the effectiveness of the Dutch casino RGP*. Paper presented to the Responsible Gambling Council of Ontario's Discovery 2002 Conference, Niagara Falls, Ontario.
- Binde, P. (2007). Selling dreams – causing nightmares? On gambling advertising and problem gambling. *Journal of Gambling Issues*, 20, 167-192.
- Binde, P. (2009). Exploring the impact of gambling advertising: An interview study of problem gamblers. *International Journal of Mental Health and Addiction*, 7 (4), 541-554.
- Bish, A., Sutton, S., & Golombok, S. (2000). Predicting uptake of a routine cervical smear test: A comparison of the health belief model and the theory of planned behaviour. *Psychology & Health*, 15, 35-50.
- Black, D., Monahan, P., Temkit, M., & Shaw, M. (2006). A family study of pathological gambling. *Psychiatry Research*, 141, 295–303.

- Blaszczynski, A., Collins, P., Fong, D., Ladouceur, R., Nower, L., Shaffer, H., Tavares, H., & Venisse, J-L. (2011). Responsible gambling: General principles and minimal requirement. *Journal of Gambling Studies*, 27 (4), 565-573.
- Blaszczynski, A., Ladouceur, R., Nower, L., & Shaffer, H.J. (2008). *Informed Choice and Gambling: Principles for Consumer Protection*. *The Journal of Gambling Business and Economics*, 2(1), 103-118.
- Blaszczynski, A., Ladouceur, R., & Shaffer, H.J. (2004). A science-based framework for responsible gambling: The Reno Model. *Journal of Gambling Studies*, 20(3), 301-317.
- Blaszczynski, A., & McConaghy, N. (1994). Antisocial personality disorder and pathological gambling. *Journal of Gambling Studies*, 10, 129-145.
- Blaszczynski, A., & Nower, L. (2002). A pathways model of problem and pathological gambling. *Addiction*, 97, 487-499.
- Blaszczynski, A., Sharpe, L., & Walker, M. (2001). *Final report: The assessment of the impact of the reconfiguration on electronic gaming machines as harm minimisation strategies for problem gambling*. [http://www.psych.usyd.edu.au/gambling/GIO\\_report.pdf](http://www.psych.usyd.edu.au/gambling/GIO_report.pdf)
- Blue Thorn Research, Population Health Promotion Associates, PFIA Corporation, & Williams, R.J. (2007). *Socioeconomic impacts of new gaming venues in four British Columbia Lower Mainland communities: Final report*. Victoria, BC: Gaming Policy and Enforcement Branch, Ministry of Public Safety & Solicitor General, Government of British Columbia. <http://www.hsd.gov.bc.ca/gaming/reports/docs/rpt-rg-impact-study-final.pdf>.
- Boddewyn, J.J. (1994). Cigarette advertising bans and smoking: the flawed policy connection. *International Journal of Advertising*, 13, 311-332.
- Boughton, R., & Brewster, J.M. (2002). *Voices of women who gamble in Ontario: A survey of women's gambling, barriers to treatment and treatment service needs*. Report for the Ontario Ministry of Health and Long-Term Care. July 2002.
- Boutin, C., Tremblay, N., & Ladouceur, R. (2009). Impact of visiting an onsite casino information centre on perceptions about randomness and gambling behaviours. *Journal of Gambling Studies*, 25, 3, 317-330.
- Braverman, J., & Shaffer, H.J. (2010). How do gamblers start gambling: identifying behavioural markers for high-risk Internet gambling. *European Journal of Public Health*. doi: 10.1093/eurpub/ckp232
- Breyer, J.L., Botzet, A.M., Winters, K.C., Stinchfield, R.D., August, G., & Realmuto, G. (2009). Young Adult Gambling Behaviors and their Relationship with the Persistence of ADHD. *Journal of Gambling Studies*.
- Bridwell, R.R., & Quinn, F.L. (2002). From mad joy to misfortune: The merger of law and politics in the world of gambling. *Mississippi Law Journal*, 72(2), 565-729.
- Broda, A., LaPlante, D.A., Nelson, S.E., LaBrie, R.A., Bosworth, L.B., & Shaffer, H.J. (2008). Virtual harm reduction efforts for Internet gambling: effects of deposit limits on actual Internet sports gambling behavior. *Harm Reduction Journal*, 5, 27.
- Brodie, M., Honeyfield, N., & Whitehead, G. (2003). *Change in bank note acceptors on electronic gaming machines in Queensland - Outcome evaluation*. <http://www.olgr.qld.gov.au/resources/responsibleGamblingDocuments/changeInBankNoteAcceptorsOnElectronicGamingMachinesInQld.pdf>
- Brokopp, J.G. (2006). Missouri stands alone with limit on losses. Reprinted from the *Chicago Sun Times*, September 8, 2006.

- Brooks, G., Ellis, T., & Lewis, C. (2008). Pachinko: A Japanese addiction? *International Gambling Studies*, 8(2), 193 - 205.
- Brunei Fm World News (2009). *Singapore: Casinos face heavy penalties should barred persons entered gaming floors*. December 16, 2009.
- Byrne, A.M., Dickson, L., Derevensky, J.L., Gupta, R., & Lussier, I. (2005). The application of youth substance use media campaigns to problem gambling: A critical evaluation. *Journal of Health Communication*, 10(8), 681 - 700.
- Buchel, C. (2006). Neuroimaging findings in pathological gambling. *European Neuropsychopharmacology*, 16(S 4), S181-S182.
- Canadian Broadcasting Corporation. (2007, June 1). *Gambler's self-ban system built on quicksand*. <http://www.cbc.ca/consumer/story/2007/06/01/olg-gambling-agreement.html>
- Canadian Partnership for Responsible Gambling. (2004). *Canadian gambling digest*. [http://www.cprg.ca/articles/canadian\\_gambling\\_digest\\_2004.pdf](http://www.cprg.ca/articles/canadian_gambling_digest_2004.pdf)
- Canadian Partnership for Responsible Gambling. (2008). *Canadian gambling digest: 2006-2007*. [http://www.cprg.ca/articles/Canadian\\_Gambling\\_Digest\\_2006-07.pdf](http://www.cprg.ca/articles/Canadian_Gambling_Digest_2006-07.pdf)
- Caraniche Pty Ltd. (2005). *Evaluation of electronic gaming machine harm minimisation measures in Victoria*. Final Report prepared for the former Victorian Gambling Research Panel. [www.austgamingcouncil.org.au/images/pdf/eLibrary/2911.pdf](http://www.austgamingcouncil.org.au/images/pdf/eLibrary/2911.pdf)
- Carlton, P.L., Manowitz, P., McBride, H., Nora, R., Swartzburg, M., & Goldstein, L. (1987). Attention deficit disorder and pathological gambling. *The Journal of Clinical Psychiatry*, 48(12), 487-488.
- Carr, R.D., Buchkoski, J.E., Kofoed, L., & Morgan, T.J. (1996). "Video lottery" and treatment for pathological gambling: A natural experiment in South Dakota. *South Dakota Journal of Medicine*, 49(1), 30-32.
- Carson, K.V., Brinn, M.P., Labiszewski, N.A., Esterman, A.J., Chang, A.B., Smith, B.J. (2001). Community interventions for preventing smoking in young people. *Cochrane Database of Systematic Reviews 2011, Issue 7*. Art. No.: CD001291. DOI: 10.1002/14651858.CD001291.pub2
- Casswell, S. (2000). A decade of community action research. *Substance Use and Misuse*, 35(1), 55-74.
- Chambers, R. & Potenza, M. (2003). Neurodevelopment, Impulsivity, and adolescent Gambling. *Journal of Gambling Studies*, 19(1), 53-84.
- Chan, C.C. & Ohtsuka, K. (2009). *Superstitions among Mahjong Players in Hong Kong: A Cultural Perspective on a Popular Chinese Gambling Game Played at Home*. Presentation at the 14<sup>th</sup> International Conference on Gambling & Risk Taking. Lake Tahoe in Stateline, Nevada. May 26, 2009.
- Chapman, S., & Lupton, D. (1994). *The fight for public health: Principles and practice of media advocacy*. London: BMJ Books.
- Chikritzhs, T., & Stockwell, T. (2006). The impact of later trading hours for hotels on levels of impaired driver road crashes and driver breath alcohol levels. *Addiction*, 101(9), 1254-1264.
- Chipman, M., Govoni, R., & Roerecke, M. (2006). *The Distribution of Consumption Model: An evaluation of its applicability to gambling behaviour*. Final Report prepared for the Ontario Problem Gambling Research Centre.

- Clark L., Lawrence, A.J., Astley-Jones, F., Gray, N. (2009). Gambling near-misses enhance motivation to gamble and recruit win-related brain circuitry. *Neuron*, 61, 481-490.
- Clotfelter, C.T. (2005). Gambling taxes. In S. Cnossen (Ed.), *Theory and practice of excise taxation: Smoking, drinking, gambling, polluting, and driving* (pp. 84-119). Oxford: Oxford University Press.
- Cloutier, M., Ladouceur, R., & Sevigny, S. (2006). Responsible gambling tools: Pop-up messages and pauses on video lottery terminals. *Journal of Psychology*, 140(5), 434-438.
- Cnossen, S. (2005). *Theory and practice of excise taxation: smoking, drinking, gambling, polluting, and driving*. Oxford: Oxford University Press.
- Collins, S. (2007). Casino forced to reveal details on big spenders. *New Zealand Herald*. December 11, 2007.
- Comings, D. (2006). Genetics of pathological gambling and substance use disorders. *European Neuropsychopharmacology*, 16(S4), S181-S181. DOI: 10.1016/S0924-977X(06)70062-1
- Cook, P.J. (2007). *Paying the tab: The costs and benefits of alcohol control*. Princeton, NJ: Princeton University Press.
- Cook, P.J., & Moore, M.J. (2002). The economics of alcohol abuse and alcohol-control policies. *Health Affairs*, 21(2), 120-133.
- Corporate Research Associates (2006). *Nova Scotia video lottery program changes: Impact analysis*. Available at <http://www.gamingcorp.ns.ca>.
- Côté, D., Caron, A., Aubert, J., Desrochers, V., & Ladouceur, R. (2003). Near wins prolong gambling on a video lottery terminal. *Journal of Gambling Studies*, 19(4), 433-438.
- Crockford, D.N., & el-Guebaly, N. (1998). Psychiatric comorbidity in pathological gambling: A critical review. *Canadian Journal of Psychiatry*, 43(1), 43-50.
- Cronce, J.M. & Corbin, W.R. (2010). Effects of alcohol and initial gambling outcomes on within-session gambling behavior. *Experimental and Clinical Psychopharmacology*, 18(2), 145-157.
- Croucher, J.S., Croucher, R.F., & Leslie, J.R. (2006). *Report of the Pilot Study on the Self-Exclusion Program conducted by GameChange* (NSW).
- Cuijpers, P., van Straten, A., Smit, F., Mihalopoulos, C., & Beekman, A. (2008). Preventing the onset of depressive disorders: A meta-analytic review of psychological interventions. *American Journal of Psychiatry*, 165, 1272-1280.
- Cunningham-Williams, R.M., Crucza, R.A., Cottler, L.B., Womack, S.B., Books, S.J., Przybeck, T.R., et al. (2005). Prevalence and predictors of pathological gambling: Results from the St. Louis personality, health and lifestyle (SLPHL) study. *Journal of Psychiatric Research*, 39, 377-390.
- Dangerfield, L. (2004). *Job satisfaction, substance use and gambling behaviour of northern Albertan casino employees*. Unpublished master's thesis, University of Lethbridge, Lethbridge, Alberta, Canada.
- Dannon, P.N., Kushnir, T., Aizer, A., Gross-Isseroff, R., Kotler, M. et al. (2011). Alternational learning in pathological gamblers: an fMRI study. *Brain Imaging and Behavior*, 5, 45-51.
- Davies, B. (2007). iCare: Integrating responsible gaming into casino operation. *International Journal of Mental Health and Addiction*, 5 (4), 307-310.
- Davis, R.M. (2003). Prevention of problem gambling: A school-based intervention. *Dissertation Abstracts International*, MA1 42 (05), 1875.



- Dawson, D.A., Goldstein, R.B., Chou, S.P., Ruan, W.J., & Grant, B.F. (2008). Age at first drink and the first incidence of adult-onset DSM-IV alcohol use disorders. *Alcoholism: Clinical and Experimental Research*, 32(12), 2149-2160.
- DeBoer, L. (1990). Jackpot size and lotto sales: Evidence from Ohio, 1986-1987. *Journal of Gambling Studies*, 6, (4), 345-354.
- De Bruin, D.E., Leenders, F.R.J., Fris, M., Verbraeck, H.T., Braam, R.V., & van de Wijngaart, G.F. (2001). *Visitors of Holland Casino: Effectiveness of the policy for the prevention of problem gambling*. CVO University of Utrecht, the Netherlands: Addictions Research Institute.
- Delfabbro, P. (2008). Evaluating the effectiveness of a limited reduction in electronic gaming machine availability on perceived gambling behaviour and objective expenditure. *International Gambling Studies*, 8 (2), 151-165.
- Delfabbro, P., Borgas, M., & King, D. (2011). Venue staff knowledge of their patrons' gambling and problem gambling. *Journal of Gambling Studies*. Published online June 1 2011. DOI: 10.1007/s10899-011-9252-2.
- Delfabbro, P., Falzon, K., & Ingram, T. (2005). The effects of parameter variations in electronic gambling simulations: Results of a laboratory-based pilot investigation. *Gambling Research*, 17(1), 7-25.
- Delfabbro, P., Lahn, J., & Grabosky, P. (2005). *Adolescent gambling in the Australian Capital Territory (ACT)*. Report to the ACT Gambling and Racing Commission. Canberra, Australia: ANU Centre for Gambling Research.
- Delfabbro, P., Lahn, J., & Grabosky, P. (2006). It's not what you know, but how you use it: Statistical knowledge and adolescent problem gambling. *Journal of Gambling Studies*, 22(2), 179-193.
- Delfabbro, P., Osborn, A., Nevile, M., Skelt, L., & McMillen, J. (2007). *Identifying problem gamblers in gambling venues*. Melbourne, Victoria, Australia: Gambling Research Australia, Office of Gaming and Racing, Department of Justice.
- Delfabbro, P., & Winefield, A.H. (1999a). Poker-machine gambling: An analysis of within session characteristics. *British Journal of Psychology*, 90, 425-439.
- Delfabbro, P., & Winefield, A.H. (1999b). The danger of over-explanation in psychological research: A reply to Griffiths. *British Journal of Psychology*, 90, 425-439.
- Derevensky, J. (2008). *Everyone's a winner! Youth perceptions of gambling advertisements*. Presentation at the European Association for the Study of Gambling. Nova Gorica, Slovenia, July, 2008.  
[http://www.assissa.eu/easg/wednesday/0910/derevensky\\_jeffrey.pdf](http://www.assissa.eu/easg/wednesday/0910/derevensky_jeffrey.pdf)
- Derevensky, J., Sklar, A., Gupta, R., & Messerlian, C. (2010). An empirical study examining the impact of gambling advertisements on adolescent gambling attitudes and behaviors. *International Journal of Mental Health and Addiction*, 8, 21-34.
- d'Hondt, R. (2007, March). *Seventeen years of responsible gaming policy at Holland Casino*. Presentation at the 6th Annual Alberta Gaming Research Institute Annual Conference, Banff, Alberta.  
<http://www.abgamblinginstitute.ualberta.ca/Events/EventsArchive/2007Conference.aspx>
- Diaz-Granados, J.L., & Graham, D.L. (2007). The effects of continuous and intermittent ethanol exposure in adolescents on the aversive properties of ethanol during adulthood. *Alcoholism: Clinical and Experimental Research*, 31(12), 2020-2027.

- Dickerson, M.G. (1979). FI schedules and persistence at gambling in the U.K. betting office. *Journal of Applied Behavior Analysis, 12*, 315-323.
- Dickerson, M.G. (1993). Internal and external determinants of persistent gambling: Problems in generalizing from one form of gambling to another. *Journal of Gambling Studies, 9*(3), 225-245.
- Dickerson, M.G., Cunningham, R., Legg-England, S., & Hinchy, J. (1991). On the determinants of persistent gambling behaviour: III: Personality, prior mood, and poker machine play. *The International Journal of the Addictions, 26*, 531-548.
- Dickerson, M.G., Hinchy, J., England, S.L., Fabre, J., & Cunningham, R. (1992). On the determinants of persistent gambling behaviour: I: High-frequency poker machine players. *British Journal of Psychology, 83*, 237-248.
- Dixon, L., Trigg, R., & Griffiths, M.D. (2007). An empirical investigation of music and gambling behaviour. *International Gambling Studies, 7*, 297-308.
- Dixon, M.R., MacLin, O.H., & Daugherty, D. (2006). An evaluation of response allocations to concurrently available slot machine simulations. *Behavior Research Methods, 38* (2), 232-6.
- Dixon, M.R., & Schreiber, J.B. (2002). Utilizing a computerized video poker simulation for the collection of data on gambling behaviour. *Psychological Record, 52*, 417-428.
- Doiron, J.P. & Nicki, R.M. (2007). Prevention of pathological gambling: A randomized controlled trial. *Cognitive Behaviour Therapy, 36* (2), 74-84.
- Dowling, N., Smith, D., & Thomas, T. (2005). Electronic gaming machines: Are they the 'crack-cocaine' of gambling? *Addiction, 100*(1), 33-45.
- Druine, C. (2009). Belgium. In G. Meyer, T. Hayer, & M. Griffiths (eds.), *Problem Gambling in Europe*. pp. 3-16. Springer.
- Duffy, M. (1996). Econometric studies of advertising, advertising restrictions and cigarette demand: A survey. *International Journal of Advertising, 15*, 1-23.
- Dufour, J., Ladouceur, R., & Giroux, I. (2010). Training program on responsible gambling among video lottery employees. *International Gambling Studies, 10* (1), 61-80.
- Dupperrex, O., Roberts, I., & Bunn, F. (2002). Safety education of pedestrians for injury prevention. *Cochrane Database of Systematic Reviews 2002*, Issue 2. doi: 10.1002/14651858.
- Durlak, J.A. (1997). Primary prevention programs in schools. *Advances in Clinical Child Psychology, 19*, 283-318.
- Durlak, J.A., & Wells, A.M. (1997). Primary prevention mental health programs for children and adolescents: A meta-analytic review. *American Journal of Community Psychology, 25*, 115-152.
- Dzik, B. (2009). Poland. In G. Meyer et al. (eds), *Problem Gambling in Europe: Challenges, Prevention, and Interventions*. Pp 219-227. Springer.
- Eisen, S., Lin, N., Lyons, M., Scherrer, J., Griffith, K., True, W., Goldberg, J., et al. (1998). Familial influences on gambling behavior: an analysis of 3359 twin pairs. *Addiction, 93*(9), 1375-1384.
- el-Guebaly, N., Patten, S.B., Currie, S., Williams, J.V.A., Beck, C.A., Maxwell, C.J., et al. (2006). Epidemiological associations between gambling behavior, substance use & mood and anxiety disorders. *Journal of Gambling Studies, 22*, 275-287.

- Electronic Privacy Information Centre (EPIC) (2005). *Spotlight on Surveillance: Facial Recognition Systems have an Ugly Effect on Personal Privacy*. Available at <http://epic.org/privacy/surveillance/spotlight/1105/default.html>
- Ellery, M., Stewart, S.H., & Loba, P. (2005). Alcohol's effects on video lottery terminal (VLT) play among probable pathological and non-pathological gamblers. *Journal of Gambling Studies*, 21(3), 299-324.
- Ellickson, P.L., Collins, R.L., Hambarsoomians, K., & McCaffrey, D.F. (2005). Does alcohol advertising promote adolescent drinking? Results from a longitudinal assessment. *Addiction*, 100(2), 235-246.
- Engebø, J., & Gyllstrøm, F. (2008). *Regulatory changes and finally a ban on existing slot machines in Norway: What's the impact on the market and problem gambling? A short presentation of various data*. Paper presented at the 2008 International Gambling Conference: Looking Forward: New Directions in Research and Minimising Public Harm., European Commission. (2006). *Study of gambling services in the internal market of the European Union: Executive summary and table of contents*. Prepared by the Swiss Institute of Comparative Law for use within the European Commission. [http://ec.europa.eu/internal\\_market/services/docs/gambling/study1\\_en.pdf](http://ec.europa.eu/internal_market/services/docs/gambling/study1_en.pdf)
- EuroPriSe (2011). *European Privacy Seal Short Public Report [on the NOVOCARD]*. <https://www.european-privacy-seal.eu/awarded-seals/DE-110025/Short-Public-Report-eng.pdf>
- Fell, J.C., Fisher, D.A., Voas, R.B., Blackman, K., & Tippetts, A.S. (2008). The relationship of underage drinking laws to reductions in drinking drivers in fatal crashes in the United States. *Accident Analysis & Prevention*, 40 (4), 1430-1449.
- Felsher, J., Derevensky, J., & Gupta, R. (2004). Lottery playing amongst youth: Implications for prevention and social policy. *Journal of Gambling Studies*, 20(2), 127-153.
- Ferland, F., Ladouceur, R., & Vitaro, F. (2002). Prevention of problem gambling: Modifying misconceptions and increasing knowledge. *Journal of Gambling Studies*, 18(1), 19-29.
- Ferland, F., Ladouceur, R., & Vitaro, F. (2005). Efficiency of a gambling prevention program for youths: Results from the pilot study. *Encephale*, 31(4), 427-436.
- Ferster, C.B., & Skinner, B.F. (1957). *Schedules of reinforcement*. New York: Appleton-Century-Crofts.
- Finlay, K., Marmurek, H.H.C., Kanetkar, V., & Londerville, J. (2007). *Assessing the contribution of gambling venue design elements to problem gambling behaviour*. Final Report prepared for the Ontario Problem Gambling Research Centre.
- Fisher, J.C. (1993). *Advertising, alcohol consumption, and abuse: A worldwide survey*. Westport, CT: Greenwood Press.
- Flinn, B. (2006, April 8). Unplugged VLTs don't turn off gambling revenue. *The Daily News (Halifax)*, p. 4.
- Floyd, K., Whelan, J.P., & Meyers, A.W. (2006). Use of warning messages to modify gambling beliefs and behavior in a laboratory investigation. *Psychology of Addictive Behaviors*, 20(1), 69-74.
- Focal Research Consultants. (2007). *Assessment of the behavioural impact of responsible gaming device (RGD) features: Analysis of Nova Scotia player-card data - the Windsor trial*. Report prepared for the Nova Scotia Gaming Corporation.

- Focal Research Consultants (2010). *Evaluating the Impact of the "My-Play" System in Nova Scotia: Phase 1: Regular VL Player Benchmark Survey*. October 2010.  
<http://www.nsgamingfoundation.org/uploads/Research/Technical%20Report%20Phase%201%20My-Play%20Benchmark%20Final%20%20 Focal %20Jan%2028%202011.pdf>
- Fong, G.T., Krantz, D.H., & Nisbett, R.E. (1993). The effects of statistical training on thinking about everyday problems. In R. E. Nisbett (Ed.), *Rules for reasoning* (pp. 91-135). Hillsdale, NJ: Erlbaum.
- Forrest, D., Perez, L., & Baker, R. (2010). Evaluating the effects of game design on lotto sales: a case study from Spain. *The Journal of Gambling Business and Economics*, 4 (2), 1-19.
- Fortune, E.E., & Goodie, A.S. (2012). Cognitive distortions as a component and treatment focus of pathological gambling. *Psychology of Addictive Behaviors*, 26(2), 298-310.
- Foxcroft, D.R. (2006). Alcohol education: absence of evidence or evidence of absence. *Addiction*, 101, 1057-1059.
- Foxcroft, D., Ireland, D., Lowe, G., & Breen, R. (2011). Primary prevention for alcohol misuse in young people. *Cochrane Database of Systematic Reviews 2011*, Issue 9. DOI: 10.1002/14651858.CD003024.pub2.
- Friedman, B. (2000). *Designing Casinos to Dominate the Competition*. Reno, NV: Institute for the Study of Gambling and Commercial Gaming, University of Nevada.
- Friend, K., & Ladd, G. (2009). Youth gambling advertising: A review of the lessons learned from tobacco control. *Drugs: Education, Prevention & Policy*, 16 (4), 283-297.
- Gaboury, A., & Ladouceur, R. (1989). Erroneous perceptions and gambling. *Journal of Social Behavior and Personality*, 4, 411-420.
- Gaboury, A., & Ladouceur, R. (1993). Evaluation of a prevention program for pathological gambling among adolescents. *Journal of Primary Prevention*, 14, 21-28.
- Gainsbury, S. (2010). *Self-exclusion: A comprehensive review of the evidence*. Report prepared for the Ontario Problem Gambling Research Centre, Guelph, Ontario, Canada. June 16, 2010.
- Gainsbury, S. (2011). Player account-based gambling: potentials for behavior-based research methodologies. *International Gambling Studies*, 11 (2), 153-171.
- Gallagher, T., Nicki, R., Otteson, A., & Elliott, H. (2011). Effects of a video lottery terminal (VLT) banner on gambling: A field study. *International Journal of Mental Health and Addiction*, 9, 126-133.
- Gamblers Anonymous. (2006). *Gamblers Anonymous international directory: South Carolina*. Retrieved August 4, 2006, from <http://www.gamblersanonymous.org/mtgdirSC.html>
- Gamblers Anonymous. (2012). *Gamblers Anonymous international directory: South Carolina*. Retrieved January 9, 2012, from <http://www.supportgroups.com/meeting-directory/gamblers-anonymous/south-carolina-gamblers-anonymous-meetings>
- Gambling Compliance Ltd. (Nov, 2007). *German Casinos Contractually Obligated to Identify all Patrons, Says Court*. <http://www.gamblingcompliance.com/node/10602>
- Gambling Research Australia (2005). *Problem Gambling and Harm: Towards a National Definition*. Commissioned for the Ministerial Council on Gambling. Prepared by the SA Centre for Economic Studies with the Department of Psychology, University of Adelaide. November 2005.
- Garrett, T.A., & Pakko, M.R. (2010). *The Revenue Performance of Casinos after a Smoking Ban: The Case of Illinois*. Working Paper 2009-027B. March 2010.  
<http://research.stlouisfed.org/wp/2009/2009-027.pdf>

- Garrett, T.A. & Sobel, R.S. (2004). State lottery revenue: The importance of game characteristics. *Public Finance Review*, 32 (3), 313-330.
- Gates, S., McCambridge, J., Smith, L.A., & Foxcroft, D.R. (2006). Interventions for prevention of drug use by young people delivered in non-school settings. *Cochrane Database of Systematic Reviews 2006*, Issue 1. doi: 10.1002/14651858.
- Gavriel-Fried, B. & Derevensky, J.L. (2009). The gestation and birth of legislation prohibiting the sale of lottery tickets to Israeli minors: some social policy issues. *International Gambling Studies*, 9 (2), 135-149.
- Gearino, D. (2008). Casinos bristle at fines for problem gamblers. *WCF Courier*. January 10, 2008.
- Giacopassi, D., Stitt, B. G., & Vandiver, M. (1998). An analysis of the relationship of alcohol to casino gambling among college students. *Journal of Gambling Studies*, 14(2), 135-149.
- Gibbs Van Brunschot, E. (2009). *Gambling and Risk Behaviour: A Literature Review*. Final Report prepared for the Alberta Gaming Research Institute. March 2009. <https://dspace.ucalgary.ca/handle/1880/47229>
- Gibson, B., Sanbonmatsu, D.M., & Posavac, S.S. (1997). The effects of selective hypothesis testing on gambling. *Journal of Experimental Psychology: Applied*, 3(2), 126-142.
- Giesbrecht, N. (2007). Reducing alcohol-related damage in populations: rethinking the roles of education and persuasion interventions. *Addiction*, 102, 1345-1349.
- Gillis, A., McDonald, J.D., & Weatherly, J.N. (2008). Native and non-native Americans playing a slot machine simulation: Effect of sensation seeking and payback percentage. *American Indian and Alaska Native Mental Health Research: The Journal of the National Center*, 15, 18-32.
- Giroux, I., Boutin, C., Ladouceur, R., Lachance, S., & Dufour, M. (2008). Awareness training program on responsible gambling for casino employees. *International Journal of Mental Health and Addiction*, 6, (4), 594-601.
- Giroux, I., & Ladouceur, R. (2006). The effect of near wins on the choice of a video lottery terminal. *Gambling Research*, 18(1), 69-75.
- Glücksspiel & Recht (2009). <http://www.gluecksspiel-und-recht.de/urteile/Bundesgerichtshof--20051215.html>; <http://www.gluecksspiel-und-recht.de/urteile/Oberlandesgericht-Hamm-20061204.html>; [http://www.gluecksspielsucht.de/materialien/urlaub\\_hamm.pdf](http://www.gluecksspielsucht.de/materialien/urlaub_hamm.pdf)
- Godinho, J.A.F. (2006). Credit for gaming in Macau. *Gaming Law Review*, 10 (4), 363-368.
- Goldman, D., Oroszi, G., & Ducci, F. (2005). The genetics of addictions: Uncovering the genes. *Nature Reviews: Genetics*, 6, 521-532.
- Goodman, A. (2008). Neurobiology of addiction: An integrative review. *Biochemical Pharmacology*, 75, 266-322.
- Gotestam, K.G., & Johansson, A. (2009). Norway. In G.Meyer et al. (eds), *Problem Gambling in Europe: Challenges, Prevention, and Interventions*. Pp 209-218. Springer.
- Goudriaan, A.E., de Bruin, D., & Koeter, M.W.J. (2009). The Netherlands. In G.Meyer et al. (eds), *Problem Gambling in Europe: Challenges, Prevention, and Interventions*. Pp 189-207. Springer.
- Goudriaan, A., Oosterlaan, J., de Beurs, E., van den Brinka, W. (2004). Pathological gambling: a comprehensive review of biobehavioral findings. *Neuroscience and Biobehavioral Reviews*, 28, 123-141.
- Grant, J., Brewer, J., & Potenza, M. (2006). The neurobiology of substance and behavioral addictions. *CNS Spectrums*, 11(12), 924-930.

- Grant, J.E., & Kim, S.W. (2001). Demographic and clinical features of 131 adult pathological gamblers. *Journal of Clinical Psychiatry*, *62*, 957-962.
- Grant, J.E., & Kim, S.W. (2002). Parental bonding in pathological gambling disorder. *Psychiatric Quarterly*, *73*, 239-247.
- Grant, J.E., Kushner, M.G., & Kim, S.W. (2002). Pathological gambling and alcohol use disorder. *Alcohol Health and Research World*, *26*, 143-150.
- Griffiths, M.D. (1991). Psychobiology of the near-miss in fruit machine gambling. *J. Psychol*, *125*, 347-357.
- Griffiths, M.D. (1993). Fruit machine gambling: The importance of structural characteristics. *Journal of Gambling Studies*, *9*(2), 101-120.
- Griffiths, M.D. (2005a). A components model of addiction within a biopsychosocial framework. *Journal of Substance Use*, *10* (4), 191-197.
- Griffiths, M.D. (2005b). Does gambling advertising contribute to problem gambling? *International Journal of Mental Health and Addiction*, *3* (2), 15-25.
- Griffiths, M.D. (2008). *Impact of High-Stake, High-Prize Gaming Machines on Problem Gambling: Overview of Research Findings*. Report prepared for the Great Britain Gambling Commission, London.
- Griffiths, M.D. (2009). Casino design: Understanding gaming floor influences on player behaviour. *Casino and Gaming International*, *5*(1), 21-26.
- Griffiths, M.D. (2012). Internet gambling, player protection, and social responsibility. In R.J. Williams, R.Wood, & J. Parke (eds.), *Routledge International Handbook of Internet Gambling*. Routledge: U.K. pp. 227-249.
- Griffiths, M.D., & Delfabbro, P. (2001). The biopsychosocial approach to gambling: Contextual factors in research and clinical interventions. *eGambling: The Electronic Journal of Gambling Issues*, Issue 5. <http://www.camh.net/egambling/issue5/feature/index.html> [now known as the Journal of Gambling Issues].
- Griffiths, M.D., & Parke, J. (2003). The environmental psychology of gambling. In G. Reith (ed), *Gambling: Who Wins? Who Loses?* pp. 277-292. New York: Prometheus Books.
- Griffiths, M.D., & Swift, G. (1992). The use of light and colour in gambling arcades: A pilot study. *Society for the Study of Gambling Newsletter*, *21*, 16-22.
- Grilli, R., Ramsay, C., & Minozzi, S. (2002). Mass media interventions: Effects on health services utilization. *Cochrane Database of Systematic Reviews 2002*, Issue 1. doi: 10.1002/14651858.
- Grinols, E.L. (2004). *Gambling in America: Costs and Benefits*. Cambridge, UK: Cambridge University Press.
- Gronbaek, M., Jensen, M.K., Johansen, D., Sorensen, T. I. A., & Becker, U. (2004). Intake of beer, wine and spirits and risk of heavy drinking and alcoholic cirrhosis. *Biol Res* *37*, 195-200.
- Gruenewald, P.J., Ponicki, W.R., & Holder, H.D. (1993). The relationship of outlet densities to alcohol consumption: A time series cross-sectional analysis. *Alcoholism: Clinical and Experimental Research*, *17*(1), 38-50.
- Grun, L., & McKeigue, P. (2000). Prevalence of excessive gambling before and after introduction of a national lottery in the United Kingdom: Another example of the single distribution theory. *Addiction*, *95*(6), 959-966.

- Gupta, R., & Derevensky, J.L. (1998). Adolescent gambling behavior: A prevalence study and examination of the correlates associated with problem gambling. *Journal of Gambling Studies*, 14(4), 319-345.
- Guttentag, D., Harrigan, K., & Smith, S. (2012). Gambling by Ontario casino employees: gambling behaviours, problem gambling and impacts of the employment. *International Gambling Studies*, DOI: 10.1080/14459795.2011.605069.
- Hafeli, J. (2009). Switzerland. In G. Meyer, T. Hayer, & M. Griffiths (eds.), *Problem Gambling in Europe: Challenges, Prevention, and Integration*. Springer. pp. 317-326.
- Hafeli, J. & Lischer, S. (2009). *Early Detection of Problem Gamblers in Swiss Casinos*. Presentation at the 14<sup>th</sup> International Conference on Gambling & Risk Taking. Lake Tahoe in Stateline, Nevada. May 2009.
- Halme, J.T. (2011). Overseas Internet poker and problem gambling in Finland 2007: A secondary data analysis of a Finnish population survey. *Nordic Studies on Alcohol and Drugs*, 28, 51-63.
- Hancock, L., Schellinck, T., & Schrans, T. (2008). Gambling and corporate social responsibility (CSR): Re-defining industry and state roles on duty of care, host responsibility and risk management. *Policy and Society*, 27, 55-68.
- Hani, O. (2008, Jan). Study: Most Israeli adolescents say they have gambled. *Haaretz.com*. January 21, 2008.
- Hansen, M. & Rossow, I. (2008). Adolescent gambling and problem gambling: Does the total consumption model apply? *Journal of Gambling Studies*, 24(2), 135-149.
- Hansen, M. & Rossow, I. (2009). Limited cash flow on slot machines: Effects of prohibition of note acceptors on adolescent gambling behavior. *International Journal of Mental Health and Addiction*, 8 (1), 70-81.
- Hansen, M. & Rossow, I. (2012). Does a reduction in the overall amount of gambling imply a reduction at all levels of gambling? *Addiction Research and Theory*, 20 (2), 145-152.
- Harrahs Entertainment. (2004). *Operation Bet Smart*.  
<http://www.problemgambling.com/harrah.html>
- Harrigan, K.A. (2008). Slot machine structural characteristics: Creating near misses using high award symbol ratios. *International Journal of Mental Health and Addiction*, 6(3), 353-368.
- Harrigan, K.A. (2009). Slot machines: pursuing responsible gaming practices for virtual reels and near misses. *International Journal of Mental Health and Addiction*, 7, 68-83.
- Harrigan, K.A., Dixon, M., MacLaren, V., Collins, K., & Fugelsang, J. (2011). The maximum rewards at the minimum price: Reinforcement rates and payback percentages in multi-line slot machines. *Journal of Gambling Issues*, 26, 11-29.
- Harrison, J.A., Mullen, P.D., & Green, L.W. (1992). A meta-analysis of studies of the Health Belief Model with adults. *Health Education Research*, 7, 107-116.
- Harvey, P.J., Swayze, J.P., & Walls, W.D. (2004). The revealed revenue effects of gambling taxation: Logit analysis of better behavior in a laboratory casino. *International Journal of Management*, 21(4), 407-414.
- Haw, J. (2008a). Random-ratio schedules of reinforcement: The role of early wins and unreinforced trials. *Journal of Gambling Issues*, 21, 56-67.
- Haw, J. (2008b). The relationship between reinforcement and gaming machine choice. *Journal of Gambling Studies*, 24, 55-61.

- Haw, J. (2009). The multiplier potential of slot machines predicts bet size. *Analysis of Gambling Behavior*, 3, 1–6.
- Hayer, T. & Meyer, G. (2011a). Self-exclusion as a harm minimization strategy: Evidence for the casino sector from selected European countries. *International Gambling Studies*, 27, 685-700.
- Hayer, T. & Meyer, G. (2011b). Internet self-exclusion: Characteristics of self-excluded gamblers and preliminary evidence for its effectiveness. *International Journal of Mental Health and Addiction*, 9, (3), 296-307.
- Heath, D.B. (1995). *International handbook on alcohol and culture*. Westport, CT: Greenwood Press.
- Hepburn, L.M., & Hemenway, D. (2004). Firearm availability and homicide: A review of the literature. *Aggression and Violent Behavior*, 9(4), 417-447.
- Hertwig, R., Barron, G., Weber, E.U., & Erev, I. (2004). Decisions from experience and the effect of rare events in risky choice. *Psychological Science*, 15(8), 534-539.
- Higgins, S.T., Silverman, K., & Heil, S.H. (Eds.). (2008). *Contingency management in substance abuse treatment*. New York: The Guilford Press.
- Hing, N. (2003). *An assessment of member awareness, perceived adequacy and perceived effectiveness of responsible gambling strategies in Sydney Clubs*. Lismore, Australia: Centre for Gambling Education and Research.  
[http://www.olgr.nsw.gov.au/pdfs/Assess\\_Member\\_Awareness\\_%202003.pdf](http://www.olgr.nsw.gov.au/pdfs/Assess_Member_Awareness_%202003.pdf) .
- Hing, N. & Nuske, E. (2011). Assisting problem gamblers in the gaming venue: an assessment of practices and procedures followed by frontline hospitality staff. *International Journal of Hospitality Management*, 30, (2), 459-467.
- Hirsch, A.R. (1995). Effects of ambient odors on slot-machine usage in a Las Vegas casino. *Psychology and Marketing*, 12, 585-594.
- Holder, H.D. (2005). Community prevention of young adult drinking and associated problems. *Alcohol Research & Health*, 28(4), 245-249.
- Holder, H.D., Agardh, E., Hogberg, P., Miller, T., Norstrom, T., Osterberg, E., et al. (2008). *Alcohol monopoly and public health: Potential effects of privatization of the Swedish alcohol retail monopoly*. Swedish National Institute of Public Health.
- Holder, H.D., Saltz, R.F., Grube, J.W., Treno, A.J., Reynolds, R.I., Voas, R.B., & Gruenewald, P.J. (1997). Summing up: Lessons from a comprehensive community prevention trial. *Addiction*, 92 (Supple. 2), S293-S301.
- Holland Casino. (2009). *Facts and figures*.  
<http://www.hollandcasino.com/en-GB/problem+gambling+prevention+policy/facts+and+figures/default.htm>
- Hospitality Association of New Zealand. (2005). *Annual Report 2005*.
- Ibanez, A., Blanco, C., & Saiz-Ruiz, J. (2002). Neurobiology and genetics of pathological gambling. *Psychiatric Annals*, 32(3), 181-184.
- Illinois Gaming Board (2008). *Statewide Voluntary Self-Exclusion Program Annual Report 2008*. July 3, 2008. <http://www.igb.state.il.us/selfxclude/2008selfexcluedeannualreport.pdf>
- Independent Pricing and Regulatory Tribunal. (2004). *Gambling: Promoting a culture of responsibility: Final report*.
- International Centre for Youth Gambling Problems and High-Risk Behaviors. (2004). *New CD ROM prevention tool*. <http://www.youthgambling.com/> .



- Jaakkola, T. (2009). Finland. In G. Meyer, T., Hayer, & M. Griffiths (eds), *Problem Gambling in Europe: Challenges, Prevention, and Interventions*. pp. 53-70. Springer.
- Jackson, A.C., Thomas, S.A., Thomason, N., & Ho, W. (2002). *Longitudinal evaluation of the effectiveness of problem gambling counselling services, community education strategies and information products - Volume 3: Community education strategies and information products*. Melbourne, Australia: Victorian Department of Human Services.
- Jackson, C., Geddes, R., Haw, S., & Frank, J. (2012). Interventions to prevent substance use and risky sexual behaviour in young people: a systematic review. *Addiction*, 107 (4), 733-747.
- Jacobs, D.F. (2004). Youth gambling in North America: Long-term trends and future prospects. In J. L. Derevensky & R. Gupta (Eds.), *Gambling problems in youth: Theoretical and applied perspectives* (pp. 1-24). New York: Kluwer Academic/Plenum Publishers.
- Jacques, C., & Ladouceur, R. (2006). A prospective study of the impact of opening a casino on gambling behaviours: 2- and 4-Year follow-ups. *Canadian Journal of Psychiatry*, 51(12), 764-773.
- Janz, N.K., Champion, V.L., & Strecher, V.J. (2002). The health belief model. In K. Glanz, B.K. Rimer & F.M. Lewis (Eds.), *Health behavior and health education: Theory, research, and practice* (3rd ed., pp. 45-66). San Francisco: Jossey-Bass.
- Jardin, B., & Wulfert, E. (2009). The use of messages in altering risky gambling behavior in college students: An experimental analogue study. *American Journal on Addictions*, 18(2), 243-247.
- Jensen, M.K., Andersen, A.T., Sorensen, T. I. A., Becker, U., Thorsen, T., & Gronbaek, M. (2002). Alcoholic beverage preference and risk of becoming a heavy drinker. *Epidemiology*, 13 (2), 127-132.
- Jit, M., Aveyard, P., Barton, P., Meads, C.A. (2010). Predicting the life-time benefit of school-based smoking prevention programmes. *Addiction*, 105 (6), 1109-1116.
- Johansson, A., & Göttestam, K.G. (2003). Gambling and problematic gambling with money among Norwegian youth (12-18 years). *Nordic Journal of Psychiatry*, 57, 317-321.
- Johnson, L., Mayer, K. Champaner, E. (2004). A customer-based assessment of casino atmospherics. *Gaming Research and Review Journal*, 8(2), 1-10.
- Jones, E.F., Beniger, J.R., & Westoff, C.F. (1980). Pill and IUD discontinuation In the United States, 1970-1975: The influence of the media. *Family Planning Perspectives*, 12(6), 293-300.
- Jonsson, J., Andren, A., Nilsson, T., Svensson, O., Munck, I., Kidstedt, A., et al. (2003). Gambling addiction in Sweden – what are the characteristics of persons with gambling problems? Reported in Binde (2007). Selling dreams – causing nightmares? On gambling advertising and problem gambling. *Journal of Gambling Issues*, 20, 167-192.
- Joukhador, J., Blaszczynski, A., & MacCallum, F. (2004). Superstitious beliefs in gambling among problem and non-problem gamblers: Preliminary data. *Journal of Gambling Studies*, 20(2), 171-180.
- Joukhador, J., Maccallum, F., & Blaszczynski, A. (2003). Differences in cognitive distortions between problem and social gamblers. *Psychological Reports*, 92(3, Pt. 2), 1203-1214.
- Ka-Chio Fong, D., & Orozio, B. (2005). Gambling participation and prevalence estimates for pathological gambling in a Far East gambling city: Macao. *UNLV Gaming Research & Review Journal*, 9, 15-28.

- Kalischuk, R.G., Nowatzki, N., Cardwell, K., Klein, K., Solowoniuk, J. (2006). Problem gambling and its impact on families: A literature review. *International Gambling Studies*, 6 (1), 31-60.
- Kassinove, J.I., & Schare, M.L. (2001). Effects of the "near miss" and the "big win" on persistence at slot machine gambling. *Psychology of Addictive Behaviors*, 15(2), 155-158.
- Kausch, O., Ruge, L., & Rowland, D.Y. (2006). Lifetime histories of trauma among pathological gamblers. *The American Journal on Addictions*, 15, 35-43.
- Keller, A., Frye, L., Bauerle, J., & Turner, J.C. (2009). Legal ages from purchase and consumption of alcohol and heavy drinking among college students in Canada, Europe, and the United States. *Substance Abuse*, 30 (3), 248-252.
- Ker, K., & Chinnock, P. (2006). Interventions in the alcohol server setting for preventing injuries. *Cochrane Database of Systematic Reviews 2006*, Issue 3. doi: 10.1002/14651858.
- Kessler, R.C., Hwang, I., LaBrie, R.A., Petukhova, M., Sampson, N.A., Winters, K.C., Shaffer, H.J. (2008). DSM-IV pathological gambling in the National Comorbidity Survey Replication. *Psychological Medicine*, 38 (9), 1351-60.
- Killias, M., van Kesteren, J., & Rindlisbacher, M. (2001). Guns, violent crime, and suicide in 21 countries. *Canadian Journal of Criminology*, 43(4), 429-448.
- Kim, P. (1992). Does advertising work: A review of the evidence. *Journal of Consumer Marketing*, 9 (4), 5 – 21.
- Kindt, J.W. (1998). Follow the money: Gambling, ethics, and subpoenas. *Annals of the American Academy of Political and Social Science*, 445, 85-97.
- Klag, S., O'Callaghan, F., & Creed, P. (2005). The use of legal coercion in the treatment of substance abusers: An overview and critical analysis of thirty years of research. *Substance Use & Misuse*, 40 (12), 1777-1795.
- Knapp, T.J. (1976). A functional analysis of gambling behaviour. In W.R. Eadington (Ed.), *Gambling and society* (pp. 276-294). Springfield, IL: Thomas.
- Korn, D., Hurson, T., & Reynolds, J. (2005). *Commercial gambling advertising: Possible impact on youth knowledge, attitudes, beliefs and behavioural intentions*. Final Report submitted to the Ontario Problem Gambling Research Centre.
- Kosonen, P., & Winne, P.H. (1995). Effects of teaching statistical laws on reasoning about everyday problems. *Journal of Educational Psychology*, 87, 33-46.
- Kumpfer, K.L., & Alvarado, R. (2003). Family-strengthening approaches for the prevention of youth problem behaviors. *American Psychologist*, 58(6/7), 457-465.
- Kumpfer, K.L., Trunnell, E.P., Whiteside, H.O. (1990). The biopsychosocial model: Application to the addictions field. In R.C. Engs (ed.), *Controversies in the Addiction Field*. pp. 55-67. Kendall-Hunt: Dubuque, Iowa.
- Kyngdon, A., & Dickerson, M. (1999). An experimental study of the effect of prior alcohol consumption on a simulated gambling activity. *Addiction*, 94(5), 697-707.
- Laansoo, S. & Niit, T (2009). Estonia. In G. Meyer, T. Hayer, & M. Griffiths (eds), *Problem Gambling in Europe* (pp 37-52). Springer.
- Ladouceur, R., Bouchard, C., Rheaume, N., Jacques, C., Ferland, F., Leblond, J., & Walker, M. (2000). Is the SOGS an accurate measure of pathological gambling among children, adolescents and adults? *Journal of Gambling Studies*, 16 (1), 1-24.
- Ladouceur, R., Boutin, C., Doucet, C., Dumont, M., Provencher, M., Giroux, I., et al. (2004). Awareness promotion about excessive gambling among video lottery retailers. *Journal of Gambling Studies*, 20(2), 181-185.

- Ladouceur, R., Ferland, F., & Fournier, P. (2003). Correction of erroneous perceptions among primary school students regarding the notions of chance and randomness in gambling. *American Journal of Health Education, 34*(5), 272-277.
- Ladouceur, R., Ferland, F., Roy, C., Pelletier, O., Bussi eres, E.-L., & Auclair, E. (2004). Pr evention du jeu excessif chez les adolescents : Une approche cognitive. *Journal de Th erapie Comportementale et Cognitive, 14*(3), 124-130.
- Ladouceur, R., Ferland, F., & Vitaro, F. (2004). Prevention of problem gambling: Modifying misconceptions and increasing knowledge among Canadian youths. *The Journal of Primary Prevention, 25*(3), 329-335.
- Ladouceur, R., Ferland, F., Vitaro, F., & Pelletier, O. (2005). Modifying youths' perception toward pathological gamblers. *Addictive Behaviors, 30*(2), 351-354.
- Ladouceur, R., Jacques, C., Giroux, I., Ferland, F., & Leblond, J. (2000). Brief communications: Analysis of a casino's self-exclusion program. *Journal of Gambling Studies, 16*(4), 453-460.
- Ladouceur, R., Jacques, C., S evigny, S., & Cantinotti, M. (2005). Impact of the format, arrangement and availability of electronic gaming machines outside casinos on gambling. *International Gambling Studies, 5*(2), 139 - 154.
- Ladouceur, R., & S evigny, S. (2003). Interactive messages on video lottery terminals and persistence in gambling. *Gambling Research, 15*, 45-50.
- Ladouceur, R., & S evigny, S. (2005). Structural characteristics of video lotteries: Effects of a stopping device on illusion of control and gambling persistence. *Journal of Gambling Studies, 21*(2), 117-131.
- Ladouceur, R., & S evigny, S. (2006). The impact of video lottery game speed on gamblers. *Journal of Gambling Issues, 17*.  
<http://www.camh.net/egambling/issue17/ladouceur.html>
- Ladouceur, R., & S evigny, S. (2009). Electronic gambling machines: Influence of a clock, a cash display, and a precommitment on gambling time. *Journal of Gambling Issues, 23*, 31-41.
- Ladouceur, R., Sylvain, C., & Boutin, C. (2000). Pathological gambling. In M. Hersen & M. Biaggio (Eds.), *Effective brief therapies: A clinician's guide* (pp. 303-318). San Diego, CA: Academic Press.
- Ladouceur, R., Sylvain, C., Boutin, C., Lachance, S., Doucet, C., Leblond, J., et al. (2001). Cognitive treatment of problem gambling. *The Journal of Nervous and Mental Disease, 189*, 774-780.
- Ladouceur, R., Sylvain, C., & Gosselin, P. (2007). Self-exclusion program: A longitudinal evaluation study. *Journal of Gambling Studies, 23*(1), 85-94.
- Ladouceur, R., Sylvain, C., Letarte, H., Giroux, I., & Jacques, C. (1998). Cognitive treatment of pathological gamblers. *Behaviour Research & Therapy, 36*, 1111-1119.
- Ladouceur, R., V ezina, L., Jacques, C., & Ferland, F. (2000). Does a brochure about pathological gambling provide new information? *Journal of Gambling Studies, 16*(1), 103-107.
- Ladouceur, R., & Walker, R. (1996). A cognitive perspective on gambling. In P. M. Salkovskis (Ed.), *Trends in Cognitive and Behavioural Therapies* (pp. 89-120). New York: John Wiley & Sons.
- Lam, L.W., Chan, K.W., Fong, D. & Lo, F. (2011). Does the look matter? The impact of casino servicescape on gaming customer satisfaction, intention to revisit, and desire to stay. *International Journal of Hospitality Management, 30*, 558-567.

- Lambos, C., & Delfabbro, P. (2007). Numerical reasoning ability and irrational beliefs in problem gambling. *International Gambling Studies*, 7(2), 157-171.
- Langer, E. J. (1975). The illusion of control. *Journal of Personality and Social Psychology*, 32, 311-328.
- Langhinrichsen-Rohling, J., Rohde, P., Seeley, J.R., & Rohling, M.L. (2004). Individual, family, and peer correlates of adolescent gambling. *Journal of Gambling Studies*, 20, 23-46.
- LaPlante, D.A., Gray, H.M., LaBrie, R.A., Kleschinsky, J.H., & Shaffer, H.J. (2012). Gaming industry employees' responses to responsible gambling training: A public health imperative. *Journal of Gambling Studies*, 28 (2), 171-191.
- LaPlante, D.A., Nelson, S.E., LaBrie, R.A., & Shaffer, H.J. (2009). Disordered gambling, type of gambling and gambling involvement in the British Gambling Prevalence Survey 2007. *European Journal of Public Health*, 21(4), 532-537.
- LaPlante, D.A., & Shaffer, H.J. (2007). Understanding the influence of gambling opportunities: Expanding exposure models to include adaptation. *American Journal of Orthopsychiatry*, 77(4), 616-623.
- Lavoie, M.-P., & Ladouceur, R. (2004). Prevention of gambling among youth: Increasing knowledge and modifying attitudes toward gambling. *Journal of Gambling Issues*, Issue 10. [http://www.camh.net/egambling/issue10/ejgi\\_10\\_lavoie\\_ladouceur.html](http://www.camh.net/egambling/issue10/ejgi_10_lavoie_ladouceur.html)
- Lawrence, A.J., Luty, J., Bogdan, N.A., Sahakian, B.J., Clark, L. (2009). Problem gamblers share deficits in impulsive decision-making with alcohol-dependent individuals. *Addiction*, 104 (6), 1006-1015.
- Lee, H-S., Lemanski, J.L., & Jun, J.W. (2008). Role of gambling media exposure in influencing trajectories among college students. *Journal of Gambling Studies*, 24, (1), 25-37.
- Lemaire, J., de Lima, S., & Patton, D. (2004). *It's Your Lucky Day: Program evaluation*. Winnipeg, MB: The Addictions Foundation of Manitoba.
- Lester, D. (1994). Access to gambling opportunities and compulsive gambling. *International Journal of the Addictions*, 29(12), 1611-1616.
- Levin, E., Rezvani, A., Montoya, D., Rose, J., & Swartzwelder, H. (2003). Adolescent-onset nicotine self-administration modeled in female rats. *Psychopharmacology*, 169(2), 141-149.
- Levitz, L.S. (1971). The experimental induction of compulsive gambling behaviours. *Dissertation Abstracts International*, 32(2-13), 1216-1217.
- Lewis, D.J., & Duncan, C.P. (1956). Effect of different percentages of money reward on extinction of a lever-pulling response. *Journal of Experimental Psychology*, 52(1), 23-27.
- Lewis, D.J., & Duncan, C.P. (1957). Expectation and resistance to extinction of a lever-pulling response as functions of percentage of reinforcement and amount of reward. *Journal of Experimental Psychology*, 54(2), 115-120.
- Lewis, D.J., & Duncan, C.P. (1958). Expectation and resistance to extinction of a lever-pulling response as a function of percentage of reinforcement and number of acquisition trials. *Journal of Experimental Psychology*, 55(2), 121-128.
- Lichtenstein, S., Slovic, P., & Zink, D. (1969). Effect of instruction in expected value on optimality of gambling decisions. *Journal of Experimental Psychology*, 79, 236-240.
- Ling, Y. (2007). A comparison of casino credit issues in the U.S., Australia, Singapore, and Macau. *Euro Asia Journal of Management*, 17 (2), 167-176.

- Livingstone, C., Woolley, R., Zazryn, T., Bakacs, L., & Shami, R. (2008). *The relevance and role of gaming machine games and game features on the play of problem gamblers*. Adelaide, South Australia: Independent Gambling Authority of South Australia. January 2008. <http://www.iga.sa.gov.au/publications.html>
- Loba, P., Stewart, S.H., Klein, R.M., & Blackburn, J.R. (2001). Manipulations of the features of standard video lottery terminal (VLT) games: Effects in pathological and non-pathological gamblers. *Journal of Gambling Studies*, 17(4), 297-320.
- Lobo, D. & Kennedy, J. (2006). The genetics of gambling and behavioral addictions. *CNS Spectrums*, 11(12), 931-939.
- Lobo, D.S., Kennedy, J.L. (2009). Genetic aspects of pathological gambling: a complex disorder with shared genetic vulnerabilities. *Addiction* 104, 1454–1465.
- Lobo, D., Souza, R., Tong, R., Casey, D., Hodgins, D., Smith, G., Williams, R.J, et al. (2010). Association of functional variants in the dopamine D2-like receptors with risk for gambling behaviour in healthy Caucasian subjects. *Biological Psychology*, 85, 33–37.
- Loo, J.M., Raylu, N., & Oei, T.P. (2008). Gambling among the Chinese: A comprehensive review. *Clinical Psychology Review*, 28(7), 1152-1166.
- Lorains, F.K., Cowlishaw, S., & Thomas, S.A. (2011). Prevalence of comorbid disorders in problem and pathological gambling: systematic review and meta-analysis of population surveys. *Addiction*, 106 (3), 490-498.
- Lovato, C., Linn, G., Stead, L.F., & Best, A. (2003). Impact of tobacco advertising and promotion on increasing adolescent smoking behaviours. *Cochrane Database of Systematic Reviews* 2003, Issue 3. doi: 10.1002/14651858.
- Lucas, A.F. (2003). The determinants and effects of slot servicescape satisfaction in a Las Vegas hotel casino. *Gaming Research and Review Journal*, 7(10), 1-19.
- Lucas, A.F., & Bowen, J.T. (2002). Measuring the effectiveness of casino promotions. *International Journal of Hospitality Management*, 21, 189-202.
- Lucas, A.F., & Kilby, J. (2008). *Principles of casino marketing*. Norman, OK: Oki International.
- Lucas, A.F. & Roehl, W.S. (2002). Influences on video poker machine performance: Measuring the effect of floor location. *Journal of Travel & Tourism Marketing*, 12(4), 75-92.
- Lund, I. (2008). The population mean and the proportion of frequent gamblers: Is the theory of total consumption valid for gambling? *Journal of Gambling Studies*, 24(2), 247-256.
- Lund, I. (2009). Gambling behaviour and the prevalence of gambling problems in adult EGM gamblers when EGMs are banned. A natural experiment. *Journal of Gambling Studies*, 25, 215–225.
- MacLin, O.H., Dixon, M.R., Daugherty, D., & Small, S.L. (2007). Using a computer simulation of three slot machines to investigate a gambler's preference among varying densities of near-miss alternatives. *Behaviour Research Methods*, 39 (2), 237-41.
- Macur, M., Makarovic, M., & Roncevic, B. (2009). Slovenia. In G.Meyer et al. (eds), *Problem Gambling in Europe: Challenges, Prevention, and Interventions*. Pp 265-279. Springer.
- Market Wire. (2000, July). *Imagis installs casino-ID And biometric facial recognition software in Gateway Casinos*.
- Marlatt, G.A., Baer, J.S., Donovan, D.M., & Kivlahan, D.R. (1988). Addictive behaviours: Etiology and treatment. *Annual Review of Psychology*, 39, 223-252.
- Marmurek, H.H.C., Finlay, K., Kanetkar, V., & Londerville, J. (2007). The influence of music on estimates of at-risk gambling intentions: An analysis by casino design. *International Gambling Studies*, 7(1), 113-122.

- Marshall, K., & Wynne, H. (2003). Fighting the odds. *Perspectives on Labour and Income*, 4(12), 5-13.
- Mayer, K., & Johnson, L., Hu, C., & Chen, S. (1998). Gaming customer satisfaction: An exploratory study. *Journal of Travel Research*, 37, 178-183.
- Mayer, K. & Johnson, L. (2003). A customer-based assessment of casino atmospherics. *Gaming Research and Review Journal*, 7(1), 21-31.
- McCormick, R.A., Russo, A.M., Ramirez, L.F., & Taber, J.I. (1984). Affective disorders among pathological gamblers seeking treatment. *American Journal of Psychiatry*, 141, 215-218.
- McDonnell-Phillips Pty Ltd. (2006). *Analysis of gambler precommitment behaviour*. Report to the National Gambling Research Program Working party on behalf of the Australian Ministerial Council on Gambling. Brisbane: Gambling Research Australia.  
[http://www.gamblingresearch.org.au/CA256902000FE154/Lookup/Precommit/\\$file/Report30March06.pdf](http://www.gamblingresearch.org.au/CA256902000FE154/Lookup/Precommit/$file/Report30March06.pdf).
- McGrath, D.S., & Barrett, S.P. (2009). The comorbidity of tobacco smoking and gambling: A review of the literature. *Drug and Alcohol Review*, 28 (6), 676-681.
- McKnight, A.J., & Peck, R.C. (2003). Graduated driver licensing and safer driving. *Journal of Safety Research*, 34(1), 85-89.
- McMillen, J., Marshall, D., & Murphy, L.T. (2004). *The use of ATMs in ACT gaming venues: An empirical study*. Report to the ACT Gambling and Racing Commission. Canberra: Australian National University Centre for Gambling Research.
- McMillen, J., & Pitt, S. (2005). *Review of the ACT Government's harm minimisation measures*.  
<http://dspace.anu.edu.au/handle/1885/45185>
- McMullan, J.L., & Miller, D. (2008). All in! The commercial advertising of offshore gambling on television. *Journal of Gambling Issues*, 22, 230-251.
- McMullan, J.L., & Miller, D. (2009a). Advertising the "new Fun-Tier": Selling casinos to consumers. *International Journal of Mental Health and Addiction*, 8 (1), 35-60.
- McMullan, J.L., & Miller, D. (2009b). Wins, winning and winners: The commercial advertising of lottery gambling. *Journal of Gambling Studies*, 26 (3), 273-295.
- Mehmel, B. (2006). *Responsible gaming information centres: Making player information accessible*. Presentation at the 13<sup>th</sup> International Conference on Gambling and Risk Taking.
- Merzel, C., & D'Afflitti, J. (2003). Reconsidering community-based health promotion: Promise, performance, and potential. *American Journal of Public Health*, 93(4), 557-574.
- Meyer, G., & Fabian, T. (1992). Delinquency among pathological gamblers: A causal approach. *Journal of Gambling Studies*, 8, 61-77.
- Meyer, G., Fiebig, M., Hafeli, J., & Morsen, C. (2011). Development of an assessment tool to evaluate the risk potential of different gambling types. *International Gambling Studies*, 11 (2), 221-236.
- Meyer, G. & Hayer, T. (2009). Germany. In G. Meyer, T. Hayer, & M Griffiths (Eds.), *Problem Gambling in Europe*. p. 85 – 101. Springer.
- Meyer, G., Hayer, T., & Griffiths, M. (2009). *Problem Gambling in Europe*. Springer.
- Miller, N.V., & Currie, S.R. (2008). A Canadian population level analysis of the roles of irrational gambling cognitions and risky gambling practices as correlates of gambling intensity and pathological gambling. *Journal of Gambling Studies*, 24, 257-274.
- Miller, N.S., & Flaherty, J.A. (2002). Effectiveness of coerced addiction treatment: A review of the clinical research. *Journal of Substance Abuse Treatment*, 18, 9-16.

- Miller, T., Snowden, C., Birckmayer, J., Hendrie, D. (2006). Retail alcohol monopolies, underage drinking, and youth impaired driving deaths. *Accident Analysis & Prevention*, 38 (6), 1162-1167.
- Miller, W.R., Wilbourne, P.L., & Hetteema, J.E. (2003). What works? A summary of alcohol treatment outcome research. In R. K. Hester & W. R. Miller (Eds.), *Handbook of alcoholism treatment approaches: Effective alternatives* (3rd ed., pp. 13-63). Boston, MA: Allyn & Bacon.
- Mishra, S., Morgan, M., Lalumiere, M.L., & Williams, R.J. (2010). Mood and audience effects on video lottery terminal gambling. *Journal of Gambling Studies*, 26, 373-386.
- Monaghan, S. & Blaszczynski, A. (2007). Recall of electronic gaming machine signs: A static versus a dynamic mode of presentation. *Journal of Gambling Issues*, 20, 253-268.
- Monaghan, S., Derevensky, J., Sklar, A. (2008). Impact of gambling advertisements and marketing on children and adolescents: policy recommendations to minimise harm. *Journal of Gambling Issues*, 22, 252-272.
- Mood Disorders Society of Canada. (2004). *Mood Disorders and Problem Gambling: Cause, Effect, or Cause for Concern: A Review of the Literature*. Guelph, ON: Author.
- Moore, A-M. (2007). Biometric technologies – An Introduction. *Biometric Technology Today*, 15 (1),6-7.
- Moreira, M.T., Smith, L.A., Foxcroft, D. (2009). Social norms interventions to reduce alcohol misuse in University or College students. *Cochrane Database of Systematic Reviews 2009, Issue 3*. DOI: 10.1002/14651858.
- Mosher, J.F., Toomey, T.L., Good, C., Harwood, E., & Wagenaar, A.C. (2002). State laws mandating or promoting training programs for alcohol servers and establishment managers: An assessment of statutory and administrative procedures. *Journal of Public Health Policy*, 23(1), 90-113.
- Najavits, L.M., Grymala, L.D., & George, B. (2003). Can advertising increase awareness of problem gambling? A Statewide survey of impact. *Psychology of Addictive Behaviors*, 17(4), 324-327.
- Napolitano, F. (2003). The self-exclusion program: Legal and clinical considerations. *Journal of Gambling Studies*, 19(3), 303-315.
- Nation, M., Crusto, C., Wandersman, A., Kumpfer, K.L., Seybolt, D., Morrissey-Kane, E., et al. (2003). What works in prevention: Principles of effective prevention programs. *American Psychologist*, 58(6-7), 449-456.
- National Alcohol Strategy Working Group. (2007). *Reducing alcohol-related harm in Canada: Toward a culture of moderation: Recommendations for a national alcohol strategy* [http://www.nationalframework-cadrenational.ca/uploads/files/FINAL\\_NAS\\_EN\\_April3\\_07.pdf](http://www.nationalframework-cadrenational.ca/uploads/files/FINAL_NAS_EN_April3_07.pdf)
- National Gambling Board. (2005). *National Gambling Board Annual Report 2005*. <http://www.ngb.org.za/>
- National Gambling Impact Study Commission. (1999). *Final report*. Washington, DC: Author.
- National Research Council. (1999). *Pathological Gambling: A Critical Review*. Washington, DC: National Academy Press.

- Neal, P., Delfabbro, P., & O'Neil, M. (2005). *Problem gambling and harm: Towards a national definition*. Commissioned for the Ministerial Council on Gambling. Prepared by the SA Centre for Economic Studies with the Department of Psychology, University of Adelaide. November 2005.  
<http://www.adelaide.edu.au/saces/gambling/publications/ProblemGamblingAndHarmTowardNationalDefinition.pdf> .
- Nelson, J.P. (2001). Alcohol advertising and advertising bans: A survey of research methods, results, and policy implications. In M R. Baye & J.P. Nelson (Eds.), *Advances in Applied Microeconomics* (Vol. 10, Ch. 11). Amsterdam: Elsevier Science.
- Nelson, S.E., Kleschinsky, J.H., LaBrie, R.A., Kaplan, S., & Shaffer, H.J. (2010). One decade of self-exclusion: Missouri casino self-excluders four to ten years after enrollment. *Journal of Gambling Studies*, 26, 129-144.
- New Zealand Lotteries Commission (2012). MyLotto FAQ.  
<http://www.mylotto.co.nz/wps/wcm/myconnect/lotteries2/nzlotteries/Primary/HowToPlayOnline/FAQs/#16>
- New Zealand Ministry of Health. (2006, August). *Poorer people still hardest hit by problem gambling*. New Zealand Ministry of Health Media Release.
- New Zealand Ministry of Health. (2008). *Raising the odds? Gambling behavior and neighbourhood access to gambling venues in New Zealand*. (Public Health Intelligence Occasional Bulletin No. 47). Wellington, New Zealand.
- Nisbet, S. (2005). Responsible gambling features of card-based technologies. *International Journal of Mental Health & Addiction*, 3(2), 54-63.
- Nixon, G. & Solowoniuk, J. (2009). Introducing the hero complex and the mythic iconic pathway of problem gambling. *International Journal of Mental Health and Addiction*, 7 (1), 108-123.
- Nixon, G., Solowoniuk, J., & McGowan, V. (2006). The counterfeit hero's journey of the pathological gambler: A phenomenological hermeneutics investigation. *Journal of Mental Health and Addiction*, 4(3), 217-232.
- Nova Scotia Gaming Corporation. (2005). *VLT time change: Findings report*. <http://nsgc.ca/>
- Noar, S.M., & Zimmerman, R.S. (2005). Health behaviour theory and cumulative knowledge regarding health behaviours: are we moving in the right direction? *Health Education Research: Theory and Practice*, 20 (3), 275-290.
- Nowatzki, N.R., & Williams, R.J. (2002). Casino self-exclusion programmes: A review of the issues. *International Gambling Studies*, 2(1), 3 - 25.
- Nower, L., & Blaszczynski, A. (2006). Impulsivity and pathological gambling: A descriptive model. *International Gambling Studies*, 6(1), 61-75.
- Nower, L. & Blaszczynski, A. (2010). Gambling motivations, money-limiting strategies, and precommitment preferences of problem versus non-problem gamblers, *Journal of Gambling Studies*, 26, 361-372.
- Nutt, D., King, L.A., Saulsbury, W., & Blakemore, C. (2007). Development of a rational scale to assess the harm of drugs of potential misuse. *The Lancet*, 369 (9566), 1047-1053.
- Oberg, S., Christie, G., & Tata, M. (2011). Problem gamblers exhibit reward hypersensitivity in medial frontal cortex during gambling. *Neuropsychologia*, 49 (13), 3768-3775.



- O'Neil, M., Whetton, S., Doman, B., Herbert, M., Giannopolous, V., O'Neil, D., et al. (2003). *Part A - Evaluation of self-exclusion programs in Victoria and Part B - Summary of self-exclusion programs in Australian States and Territories*. Melbourne: Gambling Research Panel.
- Olason, D., Sigurdardottir, K., & Smari, J. (2006). Prevalence estimates of gambling participation and problem gambling among 16–18-year-old students in Iceland: A comparison of the SOGS-RA and DSM-IV-MR-J. *Journal of Gambling Studies*, 22(1), 23-39.
- Omnifacts Bristol Research. (2007). *Nova Scotia player card research project: Stage III research report*.
- Online Casino Suite (2012). *Worldwide Gambling: International Betting Laws by Country*. <http://onlinecasinosuite.com/website/>.
- Øren, A., & Leistad, L. (2011). *Changes in Norwegian gambling habits and the influence of the ban on slot machines*. Presentation at the 8<sup>th</sup> Nordic Conference on Prevalence, Prevention, Treatment and Responsible Gaming. June 13 -15, 2011. Reykjavik, Iceland.
- Orford, J. (2009). Governments as promoters of dangerous consumptions. *Addiction*, 104 (5), 693-695.
- Osborne Group (2008). *Responsible Gaming Information Centres: 2007 Evaluation*. April 17, 2008. <http://www.responsiblegambling.org/rg-news-research/rgc-centre/published-research/docs/research-reports/responsible-gaming-information-centres-2007-evaluation>
- Pakko, M.R. (2008). No smoking at the slot machines: The effect of a smoke-free law on Delaware gaming revenues. *Applied Economics*, 40(14), 1769 - 1774.
- Parke, J. (2010). *Payback Percentage and Problem Gambling: A Critical Review of the Literature*. Final Report to the European Gaming and Betting Association. March 2010.
- Parke, J., & Griffiths, M. (2007). The role of structural characteristics in gambling. In G. Smith, D. C. Hodgins & R.J. Williams (Eds.), *Research and measurement issues in gambling studies* (pp. 217-249). Burlington, MA: Elsevier.
- Parke, A., Griffiths, M., & Irwing, P. (2004). Personality traits in pathological gambling: Sensation seeking, deferment of gratification and competitiveness as risk factors. *Addiction Research and Theory*, 12, 201-212.
- Parke, J. Rigbye, J., & Parke, A. (2008). *Cashless and card-based technologies in gambling: A review of the literature*. December 2008. Commissioned by the U.K. Gambling Commission.
- Paton, D., Siegel, D.S., & Williams, L.V. (2004). Taxation and the demand for gambling: New evidence from the United Kingdom. *National Tax Journal*, 57(4), 847-861.
- Pearce, J., Mason, K., Hiscock, R., & Day, P. (2008). A national study of neighbourhood access to gambling opportunities and individual gambling behaviour. *Journal of Epidemiology and Community Health*, 62, 862-868.
- Pelletier, M-F., & Ladouceur, R. (2007). The effect of knowledge of mathematics on gambling behaviours and erroneous perceptions. *International Journal of Psychology*, 42 (2), 134-140.
- Pelletier, A., Ladouceur, R., Fortin, J., & Ferland, F. (2004). Assessment of high school students' understanding of DSM-IV-MR-J items. *Journal of Adolescent Research*, 19, 224-232.
- Petrie, J., Bunn, F., & Byrne, G. (2007). Parenting programmes for preventing tobacco, alcohol or drugs misuse in children < 18: A systematic review. *Health Education Research*, 22(2), 177-191.

- Petry, N.M. (2005). *Pathological Gambling: Etiology, Comorbidity, and Treatment*. Washington, DC: American Psychological Association.
- Petry, N.M. (2007). Gambling and substance use disorders: Current status and future directions. *American Journal on Addictions, 16*(1), 1-9.
- Petry, N.M. & Madden, G.J. (2009). Pathological gamblers discount probabilistic rewards less steeply than controls. *Exp Clin Psychopharmacol, 17* (5), 283-290.
- Petry, N.M., & Roll, J.M. (2001). A behavioral approach to understanding and treating problem gambling. *Seminars in Clinical Neuropsychiatry, 6*(3), 177-183.
- Petry, N.M., & Steinberg, K.L. (2005). Childhood maltreatment in male and female treatment-seeking pathological gamblers. *Psychology of Addictive Behaviors, 19*(2), 226-229.
- Petry, N.M., Stinson, F.S., & Grant, B.F. (2005). Comorbidity of DSM-IV pathological gambling and other psychiatric disorders: Results from the national epidemiologic survey on alcohol and related conditions. *Journal of Clinical Psychiatry, 66*(5), 564-574.
- Phillips, J.G., Triggs, T.J., Coman, G.J., & Ogeil, R.P. (2005). Intoxication and decision aiding during computer blackjack: Preliminary analysis. *Gambling Research, 17*(2), 17-24.
- Pittman, D.J., & White, H.R. (1991). *Society, culture, and drinking patterns re-examined*. New Brunswick, NJ: Rutgers Center of Alcohol Studies.
- Popova, S., Patra, J., Sarnocinska-Hart, A., Gnam, W.H., Giesbrecht, N., & Rehm, J. (2011). Cost of privatization versus government alcohol retailing systems: Canadian example. *Drug and Alcohol Review*. doi: 10.1111/j.1465-3362.2010.00276.x.
- Potenza, M.N., Xian, H., Shah, K., Scherrer, J.F., Eisen, S.A. (2005). Shared genetic contributions to pathological gambling and major depression in men. *Archives of General Psychiatry, 62*, 9, 1015-21.
- Powell, J., Hardoon, K., Derevensky, J., & Gupta, R. (1999). Gambling and risk-taking behavior among university students. *Substance Use & Misuse, 34*(8), 1167-1184.
- Pratt, B.M., & Woolfenden, S. (2002). Interventions for preventing eating disorders in children and adolescents. *Cochrane Database of Systematic Reviews, Issue 2*. Art. No.: CD002891. DOI: 10.1002/14651858.CD002891.
- Prendergast, M., Podus, D., Finney, J., Greenwell, L., & Roll, J. (2006). Contingency management for treatment of substance use disorders: A meta-analysis. *Addiction, 101*(11), 1546-1560.
- Priest, L. (2009). The million-dollar club: Losing big, losing often. *Globe & Mail*. October 5, 2009.
- Prochaska, J.O., DiClemente, C.C., & Norcross, J.C. (1992). In search of how people change: Applications to addictive behaviours. *American Psychologist, 47*, 1102-1114.
- Productivity Commission. (1999). *Australia's gambling industries* (Report No. 10). Canberra: AusInfo.
- Productivity Commission. (2010). *Gambling Inquiry Report*. Canberra: Commonwealth of Australia.
- Raylu, N., & Oei, T.P. (2004). Role of culture in gambling and problem gambling. *Clinical Psychology Review, 23*, 1087-1114.
- Research and Service Development Centre (2007). *Review of Gambling Advertising Codes*. Report to the U.K. Responsibility in Gambling Trust.
- Regis Controls (2009). *Inquiry into barring arrangements*. Submission to the Independent gambling Authority South Australia. January 2009.
- Reid R.L. (1986). The psychology of the near miss. *Journal of Gambling Behavior, 2*, 32-39.

- Reiling, D.M., & Nusbaumer, M.R. (2006). When problem servers pour in problematic places: Alcoholic beverage servers' willingness to serve patrons beyond intoxication. *Substance Use & Misuse*, 41(5), 653-668.
- Republic of South Africa. (2004). *Government Gazette: No. 7 of 2004: National Gambling Act 2004*.
- Responsible Gambling Council (2008). *From Enforcement to Assistance: Evolving Best Practices in Self-Exclusion*. March 2008. Responsible Gambling Council, Ontario.
- Responsible Gambling Council (2009). *Play Information and Management Systems*. Responsible Gambling Council, Toronto, Ontario.
- Reuter, J., Raedler, T., Rose, M., Hand, I., Gläscher, J., & Büchel, C. (2005). Pathological gambling is linked to reduced activation of the mesolimbic reward system. *Nature Neuroscience*, 8(2), 147-148.
- Rhea, A. (2005). Voluntary self exclusion lists: How they work and potential problems. *Gaming Law Review*, 9(5), 462-469.
- Rodda, S., Brown, S., & Phillips, J. (2004). The relationship between anxiety, smoking, and gambling in electronic gaming machine players. *Journal of Gambling Studies*, 20(1), 71-81.
- Rockloff, M., & Greer, N. (2011). Audience influence on EGM gambling: The protective effects of having others watch you play. *Journal of Gambling Studies*, 27 (3),443-351.
- Rodd-Henricks, Z.A., Bell, R.L., Kuc, K.A., Murphy, J.M., McBride, W.J., Lumeng, L., et al. (2002). Effects of ethanol exposure on subsequent acquisition and extinction of ethanol self-administration and expression of alcohol-seeking behaviour in adult alcohol-preferring rats: I. Periadolescent exposure. *Alcoholism: Clinical and Experimental Research*, 26(11), 1632-1641.
- Rose, G. (1985). Sick individuals and sick populations. *International Journal of Epidemiology*, 14, 32-38.
- Rose, G. & Day, S. (1990). The population mean predicts the number of deviant individuals. *British Medical Journal*, 301, 1031-1034.
- Rossen, F. (2001). *Youth gambling: A critical review of the public health literature*. Research Report for the Centre for Gambling Studies, University of Auckland.  
[http://www.fmhs.auckland.ac.nz/soph/centres/cgs/docs/2002rossen\\_youth\\_gambling.pdf](http://www.fmhs.auckland.ac.nz/soph/centres/cgs/docs/2002rossen_youth_gambling.pdf)
- RTE News (2011). *German state bans unemployed from gambling*. March 5, 2011.
- Rush, B.R., Bassani, D.G., Urbanoski, K.A., & Castel, S. (2008). Influence of co-occurring mental and substance use disorders on the prevalence of problem gambling in Canada. *Addiction*, 103(11), 1847-1856.
- Rush, B.R., Gliksman, L., & Brook, R. (1986). Alcohol availability, alcohol consumption and alcohol-related damage: The distribution of consumption model. *Journal of Studies on Alcohol*, 47(1), 1-10.
- Rush, B.R., Veldhuizen, S., & Adlaf, E. (2007). Mapping the prevalence of problem gambling and its association with treatment accessibility and proximity to gambling venues. *Journal of Gambling Issues*, Issue 20. <http://www.camh.net/egambling/issue20/05rush.htm>
- Sadinsky, S. (2005). *Review of the problem-gambling and responsible-gaming strategy of the Government of Ontario*. Report to the Ontario Ministry of Health and Long-term Care and the Ministry of Economic Development and Trade.

- Sani, A., Carlevaro, T., & Ladouceur, R. (2005). Impact of a counselling session on at-risk casino patrons: A pilot study. *Gambling Research*, 17(1), 47-52.
- Saskatchewan Gaming Corporation. (2006). *Saskatchewan Gaming Corporation 2005-2006 Annual Report*.  
<http://www.casinomoosejaw.com/images/stories/pdfs/corporate/financials/sgc%20annual%20report%202005.pdf>
- Saskatchewan Gaming Corporation. (2007). *Saskatchewan Gaming Corporation 2006-2007 Annual Report*.  
<http://www.casinomoosejaw.com/images/stories/pdfs/corporate/financials/sgc%20annual%20report%202006.pdf>
- Saskatchewan Gaming Corporation. (2008). *Saskatchewan Gaming Corporation 2007-2008 Annual Report*.  
<http://www.casinomoosejaw.com/images/stories/pdfs/corporate/financials/sgc%20annual%20report%202007.pdf>
- Saskatchewan Gaming Corporation. (2009). *Saskatchewan Gaming Corporation 2008-2009 Annual Report*.  
<http://www.casinomoosejaw.com/images/stories/pdfs/corporate/annualreport-2009.pdf>
- Sasso, W.V., & Kalajdzic, J. (2006). *Do Ontario and its gaming venues owe a duty of care to problem gamblers?* Final Report submitted to the Ontario Problem Gambling Research Centre. Guelph, Ontario.
- Schellinck, T., & Schrans, T. (2002). *Atlantic Lottery Corporation video lottery responsible gaming feature research Final report: Conclusions and recommendations*. Focal Research Consultants Ltd. report to the Atlantic Lottery Corporation, Market & Research Development, Halifax, Nova Scotia.
- Schellinck, T., & Schrans, T. (2004). Identifying problem gamblers at the gambling venue: Finding combinations of high confidence indicators. *Gambling Research*, 16 (1), 8-24.
- Schellinck, T., & Schrans, T. (2006). *Assessment of Saskatchewan Gaming Corporation casino loyalty data in identifying risk for problem gambling*. Report prepared for the Saskatchewan Gaming Corporation.
- Schellinck, T., & Schrans, T. (2011). Intelligent design: How to model gambler risk assessment by using loyalty tracking data. *Journal of Gambling Issues*, 26, 51-68.
- Schoemaker, P.J. (1979). The role of statistical knowledge in gambling decisions: Movement versus risk dimension approaches. *Organizational Behavior and Human Decision Processes*, 24, 1-17.
- Schramm-Sapyta, N.L., Kingsley, M.A., Rezvani, A.H., Propst, K., Swartzwelder, H.S., & Kunh, C.M. (2008). Early ethanol consumption predicts relapse-like behavior in adolescent male rats. *Alcoholism: Clinical and Experimental Research*, 32(5), 754-762.
- Schrans, T., Grace, J., & Schellinck, T. (2004). *2003 NS VL responsible gaming features evaluation: Final report*. Report prepared by Focal Research Consultants Ltd. for the Nova Scotia Gaming Corporation, Halifax, Nova Scotia, October 2004.
- Schrans, T., Schellinck, T., & Grace, J. (2004). *2004 NS VL self exclusion program process test: Final Report*. Report submitted to the Nova Scotia Gaming Corporation.
- Schreiber, J., & Dixon, M.R. (2001). Temporal characteristics of slot machine play in recreational gamblers. *Psychological Reports*, 89(1), 67-72.

- Schwartz, D.G. (2010). Seeking Value or Entertainment? The Evolution of Nevada Slot Hold, 1992-2009, and the Slot Players' Experience. *Occasional Paper Series 1*. Las Vegas: Center for Gaming Research, University Libraries, University of Nevada Las Vegas, 2010.
- Secker-Walker, R.H., Gnich, W., Platt, S., & Lancaster, T. (2002). Community interventions for reducing smoking among adults. *Cochrane Database of Systematic Reviews 2002*, Issue 2. doi: 10.1002/14651858.
- Shaffer, H.J., & Hall, M.N. (2001). Updating and refining meta-analytic prevalence estimates of disordered gambling behavior in the United States and Canada. *Canadian Journal of Public Health, 92*(3), 168-172.
- Shaffer, H.J., & Hall, M.N. (2002). The natural history of gambling and drinking problems among casino employees. *Journal of Social Psychology, 142*, 405-424.
- Shaffer, H.J., LaBrie, R.A., & LaPlante, D. (2004). Laying the foundation for quantifying regional exposure to social phenomena: Considering the case of legalized gambling as a public health toxin. *Psychology of Addictive Behaviors, 18*(1), 40-48.
- Shaffer, H.J., Vander Bilt, J., & Hall, M.N. (1999). Gambling, drinking, smoking and other health risk activities among casino employees. *American Journal of Industrial Medicine, 36*(3), 365-378.
- Shah, K.R., Eisen, S.A., Xian, H., & Potenza, M.N. (2005). Genetic studies of pathological gambling: a review of methodology and analyses of data from the Vietnam Era Twin Registry. *Journal of Gambling Studies, 21* (2), 179-203.
- Sharpe, L. (2002). A reformulated cognitive-behavioral model of problem gambling: A biopsychosocial perspective. *Clinical Psychology Review, 22*, 1-25.
- Sharpe, L., Walker, M., Coughlan, M.-J., Enersen, K., & Blaszczynski, A. (2005). Structural changes to electronic gaming machines as effective harm minimization strategies for non-problem and problem gamblers. *Journal of Gambling Studies, 21*(4), 503-520.
- Shaw, M.C., Forbush, K.T., Schlinder, J., Rosenman, E., & Black, D.W. (2007). The effect of pathological gambling on families, marriages, and children. *CNS Spectrums, 12*(8), 615-622.
- Shed, N.W., Callan, M.J., & Hodgins, D.C. (2008). Probability discounting among gamblers: Differences across problem gambling severity and affect-regulation expectancies. *Personality and Individual Differences, 45*, 536-541.
- Shih, R.A., Belmonte, P.L., & Zandi, P.P. (2004). A review of the evidence from family, twin and adoption studies for a genetic contribution to adult psychiatric disorders. *International Review of Psychiatry, 16*(4), 260-283.
- Singapore Ministry of Community Development, Youth and Sports (2005, April). *Ministry of Community Development, Youth and Sports Survey*. Singapore: Author.
- Singapore Ministry of Community Development, Youth and Sports (2008). *Report of Survey on Participation in Gambling Activities among Singapore Residents, 2008*. Singapore: Author.
- Sjoberg, L. (1969). Alcohol and gambling. *Psychopharmacology, 14* (4), 284-298.
- Skaer, D.H. (1985). The effect of coming close in a gambling-like situation. *Dissertation Abstracts International-A, 46* (07), 1883.
- Skinner, B.F. (1953). *Science and human behavior*. New York: The Free Press.
- Skitch, S., & Hodgins, D.C. (2004). Impulsivity, compulsivity and pathological gambling: An exploratory study of pathological gambling as an impulsivity-compulsivity spectrum disorder. *International Gambling Studies, 4*, 175-188.

- Slater, M.D., Kelly, K.J., Edwards, R.W., Thurman, P.J., Plested, G.B.A., Keefe, T.J., et al. (2005). Combining in-school and community-based media efforts: Reducing marijuana and alcohol uptake among younger adolescents. *Health Education Research*, *21*, 157-167.
- Slawecki, C.J., & Betancourt, M. (2002). Effects of adolescent ethanol exposure on ethanol consumption in adult rats. *Alcohol*, *26*(1), 23-30.
- Slutske, W.S. (2007). Longitudinal studies of gambling behaviour. In, G. Smith, D. Hodgins, & R.J. Williams (eds.), *Research and Measurement Issues in Gambling Studies*. Elsevier.
- Slutske, W.S., Eisen, S.A., True, W.R., Lyons, M.J., Goldberg, J., & Tsuang, M. (2000). Common genetic vulnerability for pathological gambling and alcohol dependence in men. *Archives of General Psychiatry*, *57*, 666-673.
- Slutske, W.S., Eisen, S., Xian, H., True, W.R., Lyons, M.J., Goldberg, J., et al. (2001). A twin study of the association between pathological gambling and antisocial personality disorder. *Journal of Abnormal Psychology*, *110*, 297-308.
- Slutske, W., Zhu, G., Meier, M., & Martin, N. (2010). Genetic and environmental influences on disordered gambling in men and women. *Archives of General Psychiatry*, *67*, 624-630.
- Smart, R.G. (1988). Does alcohol advertising affect overall consumption? A review of empirical studies. *Journal of Studies on Alcohol*, *49*, 314-323.
- Smart, R.G., & Mann, R.E. (1995). Treatment, health promotion and alcohol controls and the decrease of alcohol consumption and problems in Ontario: 1975-1993. *Alcohol and Alcoholism*, *30*(3), 337-343.
- Smith, G.J., & Rubenstein, D. (2011). Socially responsible and accountable gambling in the public interest. *Journal of Gambling Issues*, *25*, 54-66.
- Smith, G.J., Schopflocher, D.P., el-Guebaly, N., Casey, D.M., Hodgins, D.C., Williams, R.J., & Wood, R.T. (2011). Community attitudes toward legalised gambling in Alberta. *International Gambling Studies*, *11*(1), 57-79.
- Smitheringale, B. (2001). *The Manitoba gambling customer assistance program: A summary report*. [www.afm.mb.ca/pdf/Customer assistance report gambling.pdf](http://www.afm.mb.ca/pdf/Customer_assistance_report_gambling.pdf)
- South Australian Centre for Economic Studies. (2003). *Self-exclusion programs and harm minimization policies/strategies*. Report prepared for the Gambling Research Panel, Victoria <http://www.adelaide.edu.au>
- South Australian Centre for Economic Studies. (2005). *Study of the impact of caps on electronic gaming machines: Final report*. <http://www.justice.vic.gov.au>
- South Carolina Law Enforcement Division. (2005). *2004-2005 annual accountability report*. <http://www.sled.sc.gov/Documents/GeneralInformation/FY04-05AccountabilityReport.pdf>
- Sowden, A.J. (2002). Mass media interventions for preventing smoking in young people. *Cochrane Database of Systematic Reviews 2002*, Issue 4. doi: 10.1002/14651858.
- Spenwyn, J., Barrett, D.J.K., & Griffiths, M.D. (2010). The role of light and music in gambling behaviour: An empirical pilot study. *International Journal of Mental Health and Addiction*, *8*, 107-118.
- Spinks, A., Turner, C., Nixon, J., McClure, R. (2005). The WHO Safe Communities model for the prevention of injury in whole populations. *Cochrane Database of Systematic Reviews 2005*, Issue 2.
- Stacy, A.W., Bentler, P.M., & Flay, B.R. (1994). Attitudes and health behavior in diverse populations: Drunk driving, alcohol use, binge eating, marijuana use, and cigarette use. *Health Psychology*, *13*(1), 73-85.

- Stark, G.M., Saunders, D.M., & Wookey, P. (1982). Differential effects of red and blue lighting on gambling behaviour. *Current Psychological Research*, 2, 95-100.
- Steel, Z., & Blaszczynski, A. (1998). Impulsivity, personality disorders and pathological gambling severity. *Addiction*, 93(6), 895-905.
- Steenbergh, T.A., Whelan, J.P., Meyers, A.W., May, R.K., & Floyd, K. (2004). Impact of warning and brief intervention messages on knowledge of gambling risk, irrational beliefs and behaviour. *International Gambling Studies*, 4(1), 3-16.
- Steinberg, M., & Velardo, W. (2002). *Preliminary evaluation of a casino self-exclusion program*. Paper presented at the Responsible Gambling Council of Ontario's Discovery 2002 Conference, Niagara Falls, Ontario.
- Stevens, A., Berto, D., Heckmann, W., Kersch, V., Ouevray, K., Ooyen, M., Steffan, E., & Uchtenhagen, A. (2005). Quasi-compulsory treatment of drug dependent offenders: An international literature review. *Substance Use & Misuse*, 40 (3), 269-283.
- Stewart, L., & Casswell, S. (1993). Media advocacy for alcohol policy support: Results from the New Zealand Community Action Project. *Health Promotion International*, 8 (3), 167-175.
- Stockwell, T.R. & Chikritzhs, T. (2009). Do relaxed trading hours for bars and clubs mean more relaxed drinking? A review of international research on the impacts of changes to permitted hours of drinking. *Crime Prevention and Community Safety*, 11, 153-170..
- Stockwell, T.R., & Gruenewald, P. (2003). Controls on the physical availability of alcohol. In: Heather, N. and Stockwell, T.R. *The Essential Handbook of Treatment and Prevention of Alcohol Problems*. West Sussex: John Wiley & Sons Ltd. (pp. 213-234).
- Stockwell, T.R., Gruenewald, P.J., Toumbourou, J.W., & Loxley, W. (2005). *Preventing harmful substance use: The evidence base for policy and practice*. New York: Wiley.
- Stockwell, T.R., Zhao, J., MacDonald, S., Pakula, B., Gruenewald, P., and Holder, H. (2009). Changes in per capita alcohol sales during the partial privatisation of British Columbia's retail alcohol monopoly 2003-2008: a multilevel local area analysis. *Addiction*, 104 (11), 1827-36.
- Storer, J., Abbott, M. & Stubbs, J. (2009). Access or adaptation? A meta-analysis of surveys of problem gambling prevalence in Australia and New Zealand with respect to concentration of electronic gaming machines. *International Gambling Studies*, 9(3), 225-244.
- Strasburger, V.C. (1995). *Adolescents and the media: Medical and psychological impact*. London: Sage Publications.
- Strickland, L., & Grote, F. (1967). Temporal presentation of winning symbols and slot machine playing. *Journal of Experimental Psychology*, 74, 10-13.
- Suck Won, K., Grant, J.E., Eckert, E.D., Faris, P.L., & Hartman, B.K. (2006). Pathological gambling and mood disorders: Clinical associations and treatment implications. *Journal of Affective Disorders*, 92, 109-116.
- Suh, E. (2012). Estimating the impact of free-play coupon value on players' slot gaming volumes. *Cornell Hospitality Quarterly*, 53(2), 134-143.
- Svenska Spel (2007). *Svenska Spel introduces Playscan* [Press release].  
<http://www.yogonet.com/english/history/8851>
- Sylvain, C., Ladouceur, R., & Boisvert, J.M. (1997). Cognitive and behavioral treatment of pathological gambling: A controlled study. *Journal of Consulting and Clinical Psychology*, 65(5), 727-732.

- Taioli, E., & Wynder, E.L. (1991). The importance of age of starting smoking. *New England Journal of Medicine*, 325, 968-969.
- Tang, C., Wu, A., & Tang, J. (2007). Gender differences in characteristics of Chinese treatment-seeking problem gamblers. *Journal of Gambling Studies*, 23(2), 145-156.
- Taylor, L.M. & Hillyard, P. (2009). Gambling awareness for youth: An analysis of the "Don't Gamble Away our Future" program. *International Journal of Mental Health and Addiction*, 7, 250-261.
- Taylor Nelson Sofres (TNS) (1999). *World Count of Gaming Machines 1999*. Marketing Research Report prepared for the Australian Gaming Technologies Association. September 1999.
- Taylor Nelson Sofres (TNS) (2011). *World Count of Gaming Machines 2010*. Marketing Research Report prepared for the Australian Gaming Technologies Association. January 2011. [http://www.gamingta.com/pdf/World\\_Count\\_2010.pdf](http://www.gamingta.com/pdf/World_Count_2010.pdf)
- Teo, P., Mythily, S., Anantha, S., & Winslow, M. (2007). Demographic and clinical features of 150 pathological gamblers referred to a community addictions programme. *Annals, Academy of Medicine Singapore*, 36(3), 165-168. .
- Thalheimer, R. & Ali, M. (2008). The demand for casino gaming with special reference to a smoking ban. *Economic Inquiry*, 6, 273-282.
- Thomas, R.E., Baker, P.R.A., Lorenzetti, D. (2007). Family-based programmes for preventing smoking by children and adolescents. *Cochrane Database of Systematic Reviews 2007*, Issue 1. doi: 10.1002/14651858.
- Tobler, N.S., Roona, M.R., Ochshorn, P., Marshall, D.G., Streke, A.V., & Stackpole, K.M. (2000). School-based adolescent drug prevention programs: 1998 meta-analysis. *The Journal of Primary Prevention*, 20(4), 275-336.
- Toneatto, T., Blitz-Miller, T., Calderwood, K., Dragonetti, R., & Tsanos, A. (1997). Cognitive distortions in heavy gambling. *Journal of Gambling Studies*, 13(3), 253-266.
- Toneatto, T., & Nguyen, L. (2007). Individual characteristics and problem gambling behavior. In G.Smith, D.C. Hodgins, & R.J. Williams (eds.), *Research and Measurement Issues in Gambling Studies*. pp. 279-303. Academic Press.
- Toumbourou J. (1999). Mobilising communities to prevent youth problems including homelessness and substance abuse. *Parity*, 12(8), 8.
- Toumbourou, J.W., Stockwell, T., Neighbors, C., Marlatt, G.A., Sturge, J., & Rehm, J. (2007). Interventions to reduce harm associated with adolescent substance use. *Lancet*, 369, 1391-1401.
- Toumbourou, J.W., Williams, J., Waters, E., & Patton, G. (2005). What do we know about preventing drug-related harm through social developmental intervention with children and young people? In T. Stockwell, P.J. Gruenewald, J.W. Toumbourou & W. Loxley (Eds.), *Preventing harmful substance use: The evidence base for policy and practice* (pp. 87-100). New York: John Wiley & Sons.
- Townshend, P., & Stanfield, J. (2007, March). *The behaviour of machine gambling users in a natural environment: The implications for host responsibility*. Poster session presented at the Alberta Gaming Research Institute's Gambling Research Conference 2007, Banff, Alberta.
- Treise, D.M., Taylor, R.E., & Wells, L.G. (1994). How recovering alcoholics interpret alcoholic-beverage advertising. *Health Marketing Quarterly*, 12 (2), 1325-139.



- Tremblay, J., Stinchfield, R., Wiebe, J., & Wynne, H. (2010). *Canadian Adolescent Gambling Inventory (CAGI)*. Final Report for the Canadian Consortium for Gambling Research. July 2010.
- Trollidal, B. (2005). An investigation of the effect of privatization of retail sales of alcohol on consumption and traffic accidents in Alberta, Canada. *Addiction, 100* (5), 662-671.
- Tsogas, G., Dragicevic, S., & Kudic, A. (2011). Analysis of casino online gambling data in relation to behavioural risk markers for high-risk gambling and player protection. *International Gambling Studies, 11* (3), 377-391.
- Turner, N.E., & Ferentzy, P.L. (2010). The natural life history of a lottery: the importance of large wins in the establishment and survival of a lottery. *International Gambling Studies, 10* (1), 19-30.
- Turner, N.E., Macdonald, J., Bartoshuk, M., & Zangeneh, M. (2008). The evaluation of a 1 hour prevention program for problem gambling. *International Journal of Mental Health and Addiction, 6*(2), 238-243.
- Turner, N.E., Jain, U., Spence, W., Zangeneh, M. (2008). Pathways to pathological gambling: Component analysis of variables related to pathological gambling. *International Gambling Studies, 8* (3), 281-298.
- Turner, N., Wiebe, J., Falkowski-Ham, A., Kelly, J., & Skinner, W. (2005). Public awareness of responsible gambling and gambling behaviours in Ontario. *International Gambling Studies, 5*(1), 95-112.
- Turner, N.E., Zangeneh, M., & Littman-Sharp, N. (2006). The experience of gambling and its role in problem gambling. *International Gambling Studies, 6*(2), 237-266.
- Vaillant, G.E. (1995). *The natural history of alcoholism revisited*. Cambridge, MA: Harvard University Press.
- Valleur, M. (2009). France. In G. Meyer, T. Hayer, & M. Griffiths (eds), *Problem Gambling in Europe* (pp 71-84). Springer.
- van Amsterdam, J.G.C., Best, W., Opperhuizen, A., & de Wolff, F.A. (2004). Evaluation of a procedure to assess the adverse effects of illicit drugs. *Regulatory Toxicology and Pharmacology, 39*: 1-4.
- van Holst, R., van den Brink, W., Veltman, D., & Goudriaan, A. (2010). Brain imaging studies in pathological gambling. *Current Psychiatry Reports, 12*, 418-425. DOI 10.1007/s11920-010-0141-7.
- Vaughan-Williams, L., Page, L., Parke, J., & Rigbye, J.L. (2008). British Gambling Prevalence Survey 2007: Secondary Analysis. Gambling Commission, Great Britain.  
<http://www.gamblingcommission.gov.uk/pdf/BGPS%202007%20Secondary%20analysis%20%20-%20Oct%202008.pdf>
- Victoria Department of Human Services. (2002). *Annual report, 2001-2002*. Victoria, Australia: Author.
- Vidanapathirana, J., Abramson, M.J., Forbes, A., & Fairley, C. (2005). Mass media interventions for promoting HIV testing. *Cochrane Database of Systematic Reviews 2005*, Issue 3. doi: 10.1002/14651858.
- Vitaro, F., Brendegan, M., Ladouceur, R., & Tremblay, R.E. (2001). Gambling, delinquency, and drug use during adolescence: Mutual influences and common risk factors. *Journal of Gambling Studies, 17*, 171-190.
- Volkman, K. (2008). Casinos prepare to stop limiting losses. *St. Louis Business Journal*.  
<http://www.bizjournals.com/stlouis/stories/2008/11/03/daily34.html>

- Volberg, R.A., Reitzes, D.C., & Boles, J. (1997). Exploring the links between gambling, problem gambling, and self-esteem. *Deviant Behavior: An Interdisciplinary Journal*, 18, 321-342.
- Wagenaar, A.C., & Holder, H.D. (1995). Changes in alcohol consumption resulting from the elimination of retail wine monopolies: Results from five U.S. States. *Journal of Studies on Alcohol*, 56(5), 566-572.
- Wagenaar, A.C. & Holder, H.D. (1996). The scientific process works: Seven replications now show significant wine sales increases after privatization. *Journal of Studies on Alcohol*, 57 (5), 575-6.
- Wagenaar, A.C., & Langley, J.D. (1995). Alcohol licensing system changes and alcohol consumption: Introduction of wine into New Zealand grocery stores. *Addiction*, 90(6), 773-783.
- Wagenaar, A.C., Salois, M.J., Komro, K.A. (2009). Effects of beverage alcohol price and tax levels on drinking: a meta-analysis of 1003 estimates from 112 studies. *Addiction*, 104, 179-190.
- Wagenaar, A.C., & Toomey, T.L. (2002). Effects of minimum drinking age laws: Review and analysis of the literature from 1960 to 2000. *Journal of Studies on Alcohol*, 63, S206-25.
- Walker, M.B. (2001). Strategies for winning on poker machines. In A. Blaszczynski (Ed.), *Culture and the gambling phenomenon: Proceedings of the 12th Annual Conference of the National Association for Gambling Studies* (pp. 391-396). Sydney, AU: National Association for Gambling Studies.
- Wallace, J. (1993). Modern disease models of alcoholism and other chemical dependencies: The new biopsychosocial models. *Drugs & Society*, 8 (1), 69-87.
- Wandersman, A., & Florin, P. (2003). Community interventions and effective prevention. *American Psychologist*, 58(6/7), 441-448.
- Wardle, H., Sproston, K., Orford, J., Erens, B., Griffiths, M.D., Constantine, R. & Pigott, S.(2007). *The British Gambling Prevalence Survey 2007*. London: The Stationery Office.
- Weatherly, J.N., & Brandt, A.E. (2004). Participants' sensitivity to percentage payback and credit value when playing a slot-machine simulation. *Behavior and Social Issues*, 13(1), 33-50.
- Weatherly, J.N., Sauter, J.M., & King, B.M. (2004). The "big win" and resistance to extinction when gambling. *The Journal of Psychology*, 138(6), 495-504.
- Weatherly, J.N., Thompson, B.J., Hodny, M., & Meier, E. (2009). Choice Behavior of nonpathological women playing concurrently available slot machines: Effect of changes in payback percentages. *Journal of Applied Behavior Analysis*, 42, 895-900.
- Weiss, J.W., Cen, S., Schuster, D.V., Unger, J.B., Johnson, C.A., Mouttapa, M., et al. (2006). Longitudinal effects of pro-tobacco and anti-tobacco messages on adolescent smoking susceptibility. *Nicotine & Tobacco Research*, 8(3), 455-465.
- Weissberg, R.P., & Gullotta, T.P. (1997). *Healthy Children 2010: Enhancing Children's Wellness. Issues in Children's and Families' Lives* (Vol. 8). Thousand Oaks, CA: Sage.
- Welte, J.W., Barnes, G.M., Tidwell, M-C.O., & Hoffman, J.H. (2009). Legal gambling availability and problem gambling among adolescents and young adults. *International Gambling Studies*, 9 (2), 89-99.
- Welte, J.W., Barnes, G.M., Tidwell, M.O., & Hoffman, J.H. (2009). The association of form of gambling with problem gambling among American youth. *Psychology of Addictive Behaviours*, 23, 105-112.

- Welte, J.W., Barnes, G.M, Wieczorek, W.F., Tidwell, M-C, O., Hoffman, J.H. (2007). Type of gambling and availability as risk factors for problem gambling: A tobit regression analysis by age and gender. *International Gambling Studies*, 7 (2), 183-198.
- Welte, J.W., Barnes, G.M, Wieczorek, W.F., Tidwell, M-C, O., Parker, J. (2001). Alcohol and gambling pathology among U.S. adults: Prevalence, demographic patterns and comorbidity. *Journal of Studies on Alcohol*, 62(5), 706-712.
- Welte, J. W., Wieczorek, W.F., Barnes, G.M., Tidwell, M.-C., & Hoffman, J.H. (2004). The relationship of ecological and geographic factors to gambling behavior and pathology. *Journal of Gambling Studies*, 20(4), 405-423.
- Westphal, J.R., & Johnson, L.J. (2007). Multiple co-occurring behaviours among gamblers in treatment: Implications and assessment. *International Gambling Studies*, 7(1), 73-99.
- Wikipedia (2012). *List of smoking bans in the United States*.  
[http://en.wikipedia.org/wiki/List\\_of\\_smoking\\_bans\\_in\\_the\\_United\\_States](http://en.wikipedia.org/wiki/List_of_smoking_bans_in_the_United_States)
- Wild, T. C., Roberts, A. B., & Cooper, E. L. (2002). Compulsory substance abuse treatment: An overview of recent findings and issues. *European Addiction Research*, 8, 84-93.
- Williams, M. (2007, May 30). Better Face-Recognition Software. *Technology Review*. Published by MIT. <http://www.technologyreview.com/Infotech/18796/page1/>
- Williams, R.J. (2002). *Prevention of problem gambling: A school-based intervention*. Final research report prepared for the Alberta Gaming Research Institute.  
<http://hdl.handle.net/10133/370>.
- Williams, R.J. (2010). *Pre-Commitment as a Strategy for Minimizing Gambling-Related Harm*. White Paper prepared for Unisys Australia Pty Limited and Responsible Gaming Networks (Victoria, Australia). July 8, 2010. Submission to Parliament of Australia Inquiry into Pre-Commitment Systems. <http://hdl.handle.net/10133/1287>.
- Williams, R.J., Belanger, Y.D., & Arthur, J.N. (2011). *Gambling in Alberta: History, Current Status, and Socioeconomic Impacts*. Final Report for the Alberta Gaming Research Institute. April 2, 2011. <http://hdl.handle.net/1880/48495>
- Williams, R.J., & Connolly, D. (2006). Does learning about the mathematics of gambling change gambling behavior? *Psychology of Addictive Behaviors*, 20(1), 62-68.  
<http://hdl.handle.net/10133/10369> .
- Williams, R.J., Connolly, D., Wood, R.T., Currie, S., & Davis, R.M. (2004). Program findings that inform curriculum development for the prevention of problem gambling. *Gambling Research*, 16(1), 47-69. <http://hdl.handle.net/10133/10372>.
- Williams, R.J., & Gloster, S.P. (1999). Knowledge of fetal alcohol syndrome (FAS) among Natives in Northern Manitoba. *Journal of Studies on Alcohol*, 60(6), 833-836.  
<http://hdl.handle.net/10133/10404> .
- Williams, R.J., Lee, C-K., & Back, K-J. (in press). The Prevalence and Nature of Gambling and Problem Gambling in South Korea. *Social Psychiatry and Psychiatric Epidemiology*.
- Williams, R.J., Rehm, J., & Stevens, R. (2011). *The Social and Economic Impacts of Gambling*. Final Report for the Canadian Consortium for Gambling Research. March 11, 2011.  
<http://hdl.handle.net/10133/1286>
- Williams, R.J., Royston, J., & Hagen, B. (2005). Gambling and problem gambling within forensic populations: A review of the literature. *Criminal Justice & Behavior: An International Journal* 32(6), 665-689.
- Williams, R.J. & Volberg, R.A. (in preparation). Gambling and Problem Gambling in Ontario in 2011. Final Report submitted to the Ontario Problem Gambling Research Centre.

- Williams, R.J., & Volberg, R.A. (2010). *Best Practices in the Population Assessment of Problem Gambling*. Report submitted to the Ontario Problem Gambling Research Centre. Guelph, Ontario. March 31, 2010. <http://hdl.handle.net/10133/1259>.
- Williams, R.J., Volberg, R.A., & Stevens, R. (2012). *The Population Prevalence of Problem Gambling: Methodological Influences, Standardized Rates, Jurisdictional Differences, and Worldwide Trends*. Report prepared for the Ontario Problem Gambling Research Centre and the Ontario Ministry of Health and Long Term Care. May 8, 2012. <http://hdl.handle.net/10133/3068>.
- Williams, R.J., & Wood, R.T. (2004). The proportion of gaming revenue derived from problem gamblers: Examining the issues in a Canadian context. *Analyses of Social Issues & Public Policy*, 4(1), 33-45. <http://hdl.handle.net/10133/10373>.
- Williams, R.J., & Wood, R.T. (2007a). The proportion of Ontario gambling revenue derived from problem gamblers. *Canadian Public Policy*, 33(3), 367-387.
- Williams, R.J., & Wood, R.T. (2007b). *Internet gambling: A comprehensive review and synthesis of the literature*. Report prepared for the Ontario Problem Gambling Research Centre, Guelph, Ontario. <http://hdl.handle.net/10133/432>.
- Williams, R.J., Wood, R.T., & Currie, S. (2010). Stacked Deck: An effective school-based program for the prevention of problem gambling. *Journal of Primary Prevention*, 31 (3), 109-125.
- Williams, R.J., Wood, R.T., & Parke, J. (2012a). History, current worldwide situation, and concerns with Internet gambling. In *Routledge International Handbook of Internet Gambling* by Williams, R.J., Wood, R.T., & Parke, J (eds). Routledge: London. pp. 3-26.
- Williams, R.J., Wood, R.T., & Parke, J. (2012b). Policy options for Internet gambling. In *Routledge International Handbook of Internet Gambling* by Williams, R.J., Wood, R.T., & Parke, J (eds). Routledge: London. pp. 349-364.
- Williamson, A., & Walker, M. (2001). Strategies for solving the insoluble: Playing to win Queen of the Nile. In G. Coman (Ed.), *Lessons of the past: Proceedings of the 10th National Association for Gambling Studies Conference, Mildura, 2000* (pp. 202-209). Alhington, Victoria: National Association for Gambling Studies.
- Windle, M., & Scheidt, D. M. (2004). Alcoholic subtypes: Are two sufficient? *Addiction*, 99(12), 1508-1519.
- Winters, K.C., Fawkes, T., Fahnhorst, T., Botzet, A., & August, G. (2007). A synthesis review of exemplary drug abuse prevention programs in the United States. *Journal of Substance Abuse Treatment*, 32(4), 371-380.
- Wohl, M.J.A., Christie, K-L., Matheson, K., & Anisman, H. (2010). Animation-based education as a gambling prevention tool: correcting erroneous cognitions and reducing the frequency of exceeding limits among slots players. *Journal of Gambling Studies*, 26(3), 469-86.
- Wohl, M.J.A., & Enzle, M.E. (2003). The effects of near wins and near losses on self-perceived personal luck and subsequent gambling behavior. *Journal of Experimental Social Psychology*, 39, 184-191.
- Wong, I.L.K., & So, E.M.T. (2003). Prevalence estimates of problem and pathological gambling in Hong Kong. *American Journal of Psychiatry*, 160(7), 1353-1354.
- Wood, R.T., & Williams, R.J. (2007a). Problem gambling on the Internet: Implications for Internet gambling policy in North America. *New Media & Society*, 9(3), 520-542.
- Wood, R.T., & Williams, R.J. (2007b). Internet gambling: Past, present and future. In G. Smith, D. C. Hodgins & R. J. Williams (Eds.), *Research and measurement issues in gambling studies* (pp. 486-502). Burlington, MA: Elsevier.

- Wood, R.T., & Williams, R.J. (2009). *Internet gambling: Prevalence, patterns, problems, and policy options*. Final Report to the Ontario Problem Gambling Research Centre. Guelph, ON: Ontario Problem Gambling Research Centre. <http://hdl.handle.net/10133/693>
- Wood, R.T. & Williams, R.J. (2011). A comparative profile of the Internet gambler: demographic characteristics, game play patterns, motivations, and problem gambling status. *New Media & Society*, 13(7), 1123-1141.
- Wood, R.T. & Williams, R.J. (2012). The Casino City study: A large scale international study of online gamblers. In *Routledge International Handbook of Internet Gambling* by Williams, R.J., Wood, R.T., & Parke, J (eds). Routledge: London. pp. 103-125.
- Wood, R.T., Williams, R.J., & Parke, J. (2012). The relationship between problem gambling and Internet gambling. In *Routledge International Handbook of Internet Gambling* by Williams, R.J., Wood, R.T., & Parke, J. (eds). Routledge: London. pp. 200-211.
- Woodward, J.D., Horn, C., Gatune, J., Thomas, A. (2003). *Biometrics: A Look at Facial Recognition*. Published by RAND: Santa Monica, California.
- Wynne, H.J., & Stinchfield, R. (2004). *Evaluating responsible gaming features and interventions in Alberta: Phase I - Final report*. Alberta Gaming and Liquor Commission. [http://aglc.ca/pdf/gaming/news\\_releases/VLT\\_responsible\\_features\\_phase1\\_report.pdf](http://aglc.ca/pdf/gaming/news_releases/VLT_responsible_features_phase1_report.pdf)
- Yogonet.com (2011). Greek operator OPAP to create mini-casinos. December 21, 2011. <http://www.yogonet.com/english/2011/12/21/greek-operator-opap-to-create-mini-casinos>
- Young, V. (2009). Self-banned gamblers get a loophole in Missouri. *St. Louis Post-Dispatch*. [http://www.stltoday.com/news/article\\_5066e26f-3dde-5c23-8ed0-0fc8b21dd446.html](http://www.stltoday.com/news/article_5066e26f-3dde-5c23-8ed0-0fc8b21dd446.html)
- Zhao, W., Chellappa, R., Phillips, P.J., Rosenfeld, A. (2003). Face recognition: A literature survey. *ACM Computing Surveys*, 35 (4), 399-457. <http://portal.acm.org/citation.cfm?doid=954339.954342>
- Zielke, T. & Wolfer, R.C. (2008). Facing up to gambling addicts. *Biometric Technology Today*, 16 (3), 10-11.
- Zimmerman, M., Chelminski, I., & Young, D. (2006). Prevalence and diagnostic correlates of DSM-IV pathological gambling in psychiatric outpatients. *Journal of Gambling Studies*, 22, 255-262.