Conceptual Framework of Harmful Gambling:

AN INTERNATIONAL COLLABORATION,

THIRD EDITION

Sponsored by Gambling Research Exchange Ontario (GREO),
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GAMBLING RESEARCH EXCHANGE ONTARIO
DRIVING KNOWLEDGE INTO ACTION

Abstract

Although it is seen by many as a form of leisure and recreation, gambling can have serious repercussions for individuals, families, and society as a whole. The harmful effects of gambling have been studied for decades in an attempt to understand individual differences in gambling engagement and the life-course of gambling-related problems. In this publication, we present a comprehensive, internationally relevant conceptual framework of "harmful gambling" that moves beyond a symptoms-based view of harm and addresses a broad set of factors related to population risk, community, and societal effects. Factors included in the framework represent major topics relating to gambling that range from specific (gambling environment, exposure, types, and resources) to general (cultural, social, psychological, and biological). The framework has been created by international, interdisciplinary experts in order to facilitate an understanding of harmful gambling. It reflects the state of knowledge related to factors influencing harmful gambling, and serves a secondary purpose as a guide for the development of future research programs and to educate policy makers on issues related to harmful gambling. Gambling Research Exchange Ontario (GREO) (formerly the Ontario Problem Gambling Research Centre (OPGRC) located in Guelph, Ontario, Canada) has facilitated the development of the Conceptual Framework of Harmful Gambling and retains responsibility for keeping it up-to-date.

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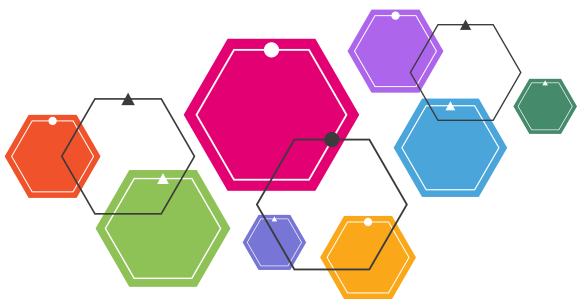
Table of Contents

1. About the Framework

Gambling has a long history and is present in most cultures throughout the world. It takes many forms and occurs in different settings, from table games at casinos to Internet-based games at home, participating in lotteries at work, or placing a wager on a sport team with friends. While many people gamble as a form of leisure and recreation, it can also have serious repercussions for individuals, their families, and society as a whole.

The harmful effects of gambling have been studied for decades across many different forms of gambling. We have chosen to take a broad view of the harm caused by gambling in order to explore its far-reaching influences. Although various models have been developed internationally that advance our understanding of the individual differences in gambling engagement and gambling-related problems, no model has been able to provide a comprehensive view of gambling-related harm–one that spans countries, cultures, and scientific disciplines.

The Conceptual Framework of Harmful Gambling ("the Framework") is a unique summary of factors associated with harmful gambling, created by international experts who are mindful of the quality of the evidence they are providing. It synthesizes some of the most current and robust findings across broad domains of gambling. In doing so, it provides a general overview of factors known to be associated with harmful gambling, while providing opportunities to locate more information. Harmful gambling is a complex issue, so the Framework employs a multidimensional perspective for a more complete understanding of the issue. Although similar exercises have been attempted in the past, we believe no complete and comprehensive framework existed before this one was developed.



1.1 KEY OBJECTIVES OF THE FRAMEWORK

The motivation for this project was the recognition of a need for a comprehensive framework of harmful gambling. In autumn 2011, Gambling Research Exchange Ontario (GREO)—known as the Ontario Problem Gambling Research Centre (OPGRC) at the time—initiated an effort that brought together interdisciplinary experts from around the world. The aim was to develop a clear, comprehensive, and internationally relevant conceptual framework that would address a broad set of factors related to the risks and effects of harmful gambling at the individual, family, and community levels. For this edition, many of the original experts have remained involved, and new authors have contributed material outlining important developments that have emerged since the previous update. Biographies of both the original and new contributors are included in Appendix A, along with acknowledgements.

The Framework is designed to achieve three key objectives:

- Reflect the current state of knowledge (across disciplines and existing models) as it relates to factors linked to harmful gambling. While there is some discussion of overlap among factors, this publication does not provide an in-depth review of these dependencies or interactions.
- Assist treatment providers, policy makers, regulators, and the public to better understand the complex dynamics involved in harmful gambling to enable better informed decision making.
- Guide the development of future research programs by identifying areas where research is most needed.

Ongoing development of the Framework: In spring 2013, the first edition of the Framework[1] was published on the GREO website with an option for readers to comment on the document via an online survey. The subsequent revision in 2015[2] included further information and updates based on survey results, stakeholder comments, and new research information. This led to several improvements both conceptually and structurally. GREO is committed to continually improving the Framework so that it remains relevant and accessible, and contributes to the understanding and awareness of harmful gambling.

The current edition was undertaken in consultation with the expert panel members. They recommended that the existing Framework structure be maintained, but also identified areas where more information was needed. In this version, there is new information about the Taxonomy of Gambling Harms,[3] the convergence of gambling and gaming, and social and economic impacts. Other areas have been expanded to reflect increased interest; these include treatment interventions, comorbidities, gender, Indigenous groups, and judgment and decision making, among others. Supporting references are updated in all sections to point readers to the most current information and foundational studies.

Intended audience: The Framework is intended to be accessible to and informative for a broad audience. This includes researchers, policy makers, health care and treatment providers, and the general public. This publication is not a research paper, nor does it outline any one model, theory, or pathway from past research. Instead, it aims to highlight the major factors that contribute to harmful gambling, and major, high-level interrelationships among those factors to illustrate the complexity of harmful gambling. A summary of some of the key models considered by the authors while developing the Framework can be found in Section 4: Summary of Existing Research that Informed Our Work.

Strength of evidence: We recognize that the strength of evidence varies markedly across the different areas discussed in the Framework. This is due, in part, to our panel's range of expertise, as well as to the availability of research. It also points to areas where research funding has existed in the past (usually a reflection of policy interests and priorities), and where there is a need for governments and other organizations to provide funding in the future (emerging issues related to harmful gambling). While we do discuss the strength of evidence related to particular factors, we have not provided an exhaustive review, which was outside the scope of this project and does not align with its intended objectives. However, each section of the publication does cite original research studies and reviews, where these were identified at the time of publication.

1.2 DEFINING GAMBLING

In general, gambling is staking money or something of material value on an event having an uncertain outcome in the hope of winning additional money and/or material goods.[4] The definition of gambling is likely to continue to evolve with societies and cultures, as norms around gambling continue to change over time in different countries. Once seen as illegal, immoral, or disreputable, gambling is often seen today as a form of recreation and, at times, even as a source of income. Further clarification is helpful in understanding how gambling activities are defined in different situations:

- *Commercial gambling*, which is the focus of this publication, is a formal, regulated style of gambling that includes a variety of gambling types such as casinos, video lottery terminals, lottery tickets, horse racing, and legal sports betting, among others. Commercial gambling is characterized by an unequal relationship between the gambling provider and the gamblers: as a group, the gamblers always lose money to the provider. Monetary loss is the most distinctive characteristic of harmful gambling.
- *Private gambling* includes betting on card games such as poker among friends, or betting on sports results with colleagues at the office. Unlike commercial gambling, money is redistributed within the group, and individual losses and wins depend on chance or skill. Private gambling usually takes place in informal social settings and provides opportunities to engage competitively with others, demonstrate skills, and gain prestige among friends.
- *Recreational gambling* is gambling for leisure, recreation, or entertainment purposes and in low-risk and/or controlled situations. Recreational gambling can sustain, enhance, or have little to no impact on a gambler's well-being (although this is not intended to imply that gambling promotes personal growth and/or health). A discussion of recreational gambling and some of the positive aspects of gambling can be found in a publication titled, "Why people gamble: A model with five motivational dimensions".[5] Recreational gambling has also been referred to as responsible, healthy, social, low-risk, leisure, or private gambling.
- *Illegal gambling* represents yet another group of gambling activities. It includes bookmaking on sports and horse races, underground casinos, and *numbers running*. Like commercial gambling, illegal gambling is characterized by an unequal relationship between providers and players. Unlike commercial gambling, illegal gambling providers are not constrained by laws

or regulations to pay winners or to collect debts through legitimate avenues. One important argument in favour of legalizing gambling in many jurisdictions has been that legalization will force illegal providers of these activities out of business. Almost no research has assessed whether or not this claim is true, and there is some evidence to suggest that illegal operators can sometimes benefit from the establishment of legal versions of the games that they provide.[6]

- *Gaming* is sometimes used interchangeably with *gambling*, but they are not the same thing. Gaming refers to videogames only. Gaming outcomes are achieved mainly by skill, whereas gambling outcomes are achieved primarily by chance. Some games include elements of gambling (e.g., Loot Boxes and gambling scenarios), while some forms of gambling have adopted game-like elements (e.g., skill-based slot machines and arcade casino games). Section 2.2.5 provides more information about the Convergence of Gaming and Gambling.

We define *harmful gambling* as any type of repetitive gambling that a person engages in that leads to (or aggravates) recurring negative consequences, such as significant financial problems, addiction, or physical and mental health issues. Additionally, the gambler's family, social network, and community may also experience negative effects. The degree of harm can range from inconsequential, to transient, to significant; harm can be episodic or chronic. In this publication, we treat harmful gambling as a term that encompasses the full spectrum of severity and frequency.

Harmful gambling has also been referred to as problem gambling, compulsive gambling, irresponsible gambling, gambling disorder, and pathological gambling. The differences among these terms are, in part, a matter of severity and frequency of gambling. Gambling disorder is the most extreme form of harmful gambling, as currently outlined in the *Diagnostic and Statistical Manual of Mental Disorders - Fifth Edition* (DSM-5).[7]

1.3 VALUE OF THE FRAMEWORK

Gambling is a multi-disciplinary area of research and the Framework takes into consideration many different perspectives and topic areas. Some of the specific ways it adds value include:

Using harm as the organizing principle: The Framework moves beyond a symptoms-based view of harm that focuses on the individual and considers harm to families and society as a whole. As such, it offers a broader perspective on gambling-related problems and consequences.

Demonstrating areas of robust evidence: The Framework highlights areas where knowledge is robust and where it is not, which can point to areas for future research.

Promoting theory-driven research: The most comprehensive models of harmful gambling integrate genetic, biological, psychological, economic, social, societal, and cultural factors. Typically, models depict a number of interconnected factors and a dynamic process by which a change in one or several factors has the potential to affect an individual's gambling status (i.e., pathways to harmful gambling). In contrast, the Framework does not commit to any particular

theory or analytical perspective. Rather, it provides a comprehensive view of factors with recognized links to harmful gambling with no defined paths. This approach urges researchers, decision makers, and others to think about the complexity of harmful gambling and to pursue new, theory-driven research.

Examining harm reduction: Our goal is to promote the consideration of a harm reduction approach to gambling. Harm reduction goes beyond abstinence and generally refers to reducing harm or increasing safety related to gambling. In a harm reduction approach, the central concepts are empowerment of people who are negatively affected by gambling and harm reduction approaches that work toward the well-being of the community and the protection of people through regulation, type of gambling environment, and types of gambling products made available in the community. These have implications for both clinical treatment goals and public policy.

Enabling analysis of gambling impact: A harm-based view considers the costs and benefits to the gambler, the family, community, and society. Estimates of the relative extent of harm or relative cost to society have been made and are provided here.

The value of positioning gambling harm as the organizing principle has important implications–both for gambling researchers and for other stakeholders in the gambling community. First, a framework focused on harm can be readily integrated into mental health promotion and community development, and provide a driving force for healthy corporate, regulatory, and public policy initiatives that reduce the potential for gambling-related harms. Second, such a framework positions gambling harm within the relevant academic disciplines of both public health and addictions. Third, the Framework addresses harm reduction and minimization by embracing clinical goals such as abstinence and reduced gambling participation. Doing so makes it especially useful for certain population sub-groups (e.g., youth, marginalized groups, and older adults) where commitment to abstinence may not be an appealing goal. Lastly, examining harm encourages conversations about how to support non-harmful gambling. This is particularly important for decision makers whose goal is to optimize profit while reducing harm.

Conceptualizing harm: The value of conceptualizing harm and identifying factors that influence harm has been recognized in other fields. Such harm-based frameworks also provide value in understanding harmful gambling.

For example, the U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, has compiled a comprehensive overview titled, "Risk and Protective Factors for Mental, Emotional, and Behavioral Disorders Across the Life Cycle",[8] which includes several factors relating to substance abuse. These and other frameworks provide insights into, and inspiration for, how this conceptual framework may be applied and further developed.

1.4 OVERVIEW OF THE FRAMEWORK

The framework consists of eight interrelated factors, separated into two topical sets. *Gambling Specific Factors* included in the Framework are: gambling environment, gambling exposure, gambling types, and gambling resources. These represent major themes in gambling studies and groupings of factors that are relevant across all other Framework factors. *General Factors* include: cultural, social, psychological, and biological. The general factors represent major areas of scientific study. Each of the general factors is directly or indirectly related to the life course of harmful gambling and may or may not interact with other factors. Within each factor, there are between two to eight relevant sub-factors.

All factors and sub-factors are outlined in greater detail in the sections that follow, with the discussion moving from broad concepts that affect society (e.g., gambling environment, gambling exposure) to those that more specifically affect individuals (e.g., psychology, biology). Each grouping of factors is defined and discussed in stand-alone sections.

Gambling Specific Factors: *Gambling environment* (i.e., the economic and political environment) can impact the nature and frequency of gambling activity, and the degree of gambling-related harm that results. *Gambling exposure* is a prerequisite for harmful gambling since no gambling would occur without the opportunity to do so. *Gambling types* refers to various forms of gambling, which may have different potential to cause harm. *Gambling resources* refer to resources available to the individual that can prevent or reduce harm.

General Factors: *Cultural factors* have an impact on gambling prevalence, the popularity of various gambling forms, attitudes towards gambling, and gambling practices. *Social factors* shape how commercial gambling is made available and how people who develop difficulties are perceived by others. It also influences attitudes and beliefs about different types of gambling, and best practices for treatment. *Psychological factors* include individual differences in personality and temperament, self-perceptions, social learning, lifespan development, co-morbid disorders, subjective well-being, coping styles, and judgment and decision making. *Biological factors* consider genetically inherited and/or biological tendencies toward harmful gambling.

Below is one example of how the Framework may be applied to identify future research directions by examining the nature of the links between *gambling accessibility* and the prevalence of harmful gambling:

- Most, if not all, sub-factors under Gambling Exposure relate to the accessibility of gambling.
- Under Biological factors, genetic predispositions can be risk factors that, in turn, influence Psychological factors.
- Under Psychological factors, changes in accessibility can affect people differently, depending on their lifespan and experiences with other existing disorders. Personality, temperament, and coping styles also interact with gambling accessibility.
- Under Social factors, the physical location of gambling venues within neighbourhoods is related to higher or lower rates of harmful gambling. The social environment where gambling is accessible also plays an important role, as does social learning.
- Under Cultural factors, ethnicity and traditions can directly affect availability (e.g., gambling is strictly forbidden in some cultures), and sociocultural perceptions can also affect accessibility.

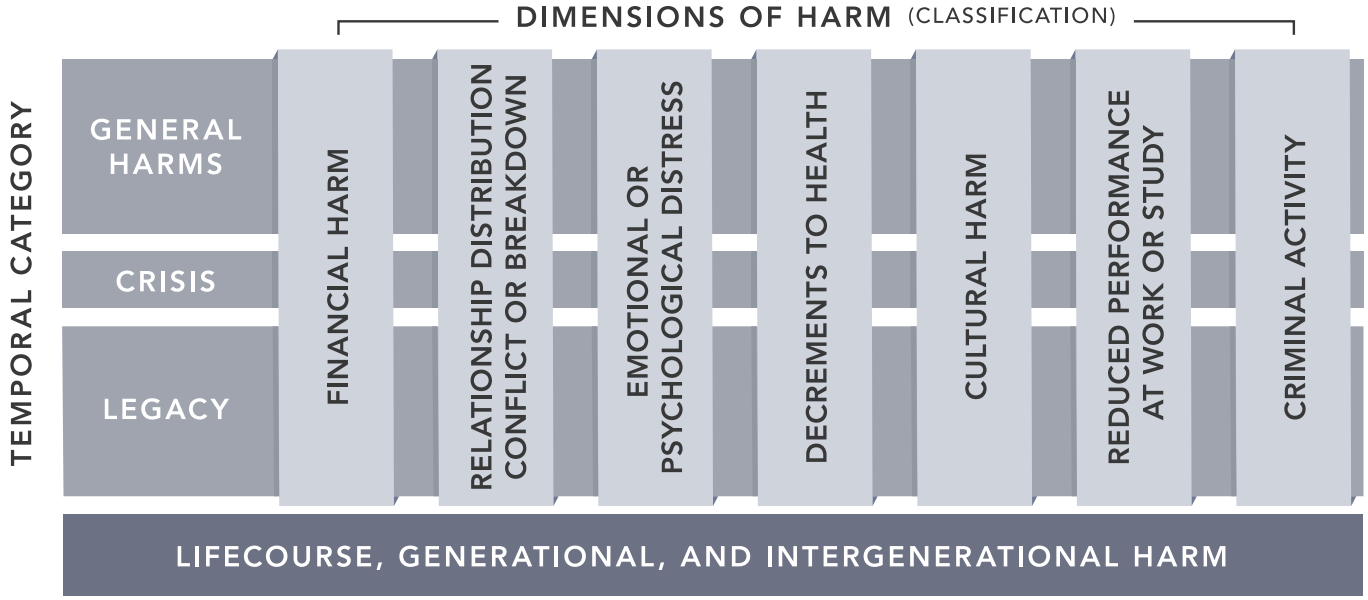
This application of the Framework to the concept of accessibility highlights several possible new directions for research. It underscores the importance of considering gender, age, and ethnicity in relation to the availability of specific forms of gambling, as well as the role of social learning in relation to legal and illegal forms of gambling.

1.5 HARMFUL GAMBLING AND GAMBLING-RELATED HARM

The emphasis in gambling research has been gradually shifting from *counting heads* (i.e., prevalence studies) to *counting harms*.[9] The Framework outlines factors that usually precede or accompany harmful gambling. A complementary framework, the Taxonomy of Harms ("the Taxonomy"),[3] has been developed by Australian researchers who adopted a public health perspective and used a variety of research approaches to examine and categorize the types of harm that can result from gambling. The Taxonomy serves as a catalogue of harms by identifying seven dimensions of harm related directly or indirectly to gambling:[10] financial, emotional, relationship disruption, physical health, work performance, criminal, and cultural.[3, 10]

Intersecting with the Taxonomy dimensions are three temporal categories that refer to the severity, or stage, of the gambling problem. These include *General harms*, which are minor harms that may occur after a person begins gambling; *Crisis harms*, which are severe enough that the person believes that he or she has a problem with gambling; and, *Legacy harms*, which have a long-term effect, even if the person might no longer gamble. Underlying the harm dimensions and temporal stages are life course, generational, and intergenerational considerations, since gambling harm has the potential not only to affect the individual, but also to extend to families and communities, and alter life circumstances and opportunities for others. This is similar to the Conceptual Framework where the severity, and short- and long-term effects of harmful gambling are considered.

There is substantial overlap between many of the Taxonomy dimensions and the Framework factors, indicating a high degree of interrelationship between the two frameworks. Further, both the Conceptual Framework and the Taxonomy consider multiple influences at individual, institutional, and societal levels. They also both look at harms experienced across the full spectrum of gambling behaviour, from people who gamble recreationally to those with gambling problems.



Source: Conceptual Framework of Gambling Harm. (2016). Langham, Thorne, Browne, Donaldson, Rose, and Rockloff[3, p6]
(Research funded by the Victorian Responsible Gambling Foundation)

1.6 RELEVANCE OF FRAMEWORK TO STAKEHOLDERS

A summary of the Framework's relevance to three stakeholder groups is provided below, although there may be other groups that could benefit from the publication.

Researchers: The Framework provides researchers with a flexible and comprehensive visual tool that can be used to quickly identify the range of factors that contribute to harmful gambling. It can be used to prioritize research activities, and guide the development of research programs and teaching curricula. It indicates areas of research that are well supported by evidence, and others that require more research resources, time, and funding. It also provides a quick reference to prominent studies for areas with which the researcher may not be completely familiar.

Treatment providers: For treatment providers and the agencies they work with, the Framework illustrates the breadth and complexity of harmful gambling, thereby highlighting its gravity. Some treatment providers use the Framework for presentations to other agencies, funders, and even to their clients. It could also be used to triage activities prior to treatment, or in clinic during treatment. There are further opportunities for connecting the social determinants of health, and more specifically mental health (as identified by Health Canada, etc.), to the Framework since harmful gambling has been addressed almost exclusively within the healthcare system, without much consideration of related social determinants. There is evidence to suggest that this has begun to change and some jurisdictions are adopting a broader public health perspective. By *jurisdiction*, we refer to a particular geographic area that has a defined legal authority such as a national, state, or provincial government. Still, New Zealand remains the only country that approaches gambling as a public health issue, and where it is required by law that all problem gambling strategies integrate elements of harm prevention and minimization to promote public health.[11]

Government: GREO and other stakeholders can use the Framework to facilitate their communication to government about the complexity, impact, and gravity of harmful gambling. By understanding the overall cost to society, governments can make more informed and effective decisions about under-served and/or under-funded areas of harmful gambling research. It can also highlight particular environments, products, or characteristics of products that are most closely associated with gambling harm and, therefore, where observation and intervention are most needed. Finally, the Framework can draw attention to challenges that treatment providers face in addressing the multidimensional issue of harmful gambling, as well as the need for a variety of harmful gambling prevention and treatment strategies and resources.

To access further information about research referred to in this publication, two-page summaries of many of the referred works are available to readers through GREO's Synopses and Research Snapshot Projects–a resource for plain language summaries of peer-reviewed gambling research publications. Each summary describes the research objectives, methodologies, key results, limitations, and conclusions of the referred work in this publication, as well as of other research. References for which a summary is available are linked to the corresponding webpage in the GREO Evidence Centre.

REFERENCES

1. Abbott M, Binde P, Hodgins D, Korn D, Pereira A, Volberg R, et al. Conceptual framework of harmful gambling: An international collaboration. Guelph, ON: The Ontario Problem Gambling Research Centre (OPGRC); 2013. Available from: http://www.greo.ca/Modules/EvidenceCentre/Details/conceptual-framework-of-harmful-gambling.

2. Abbott M, Binde P, Clark L, Hodgins D, Korn D, Pereira A, et al. Conceptual framework of harmful gambling: An international collaboration, revised edition. Guelph, Ontario, Canada: Gambling Research Exchange Ontario (GREO); 2015. Available from: http://www.greo.ca/Modules/EvidenceCentre/Details/conceptual-framework-of-harmful-gambling-revised-edition.

3. Langham E, Thorne H, Browne M, Donaldson P, Rose J, Rockloff M. Understanding gambling related harm: a proposed definition, conceptual framework, and taxonomy of harms. *BMC Public Health*. 2016;16(1):80. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/defining-and-categorizing-gambling-related-harms

4. Williams RJ, Volberg R, Stevens M, Williams LA, Arthur J. The definition, dimensionalization, and assessment of gambling participation. Canadian Consortium for Gambling Research; 2017. Available from: https://www.uleth.ca/dspace/bitstream/handle/10133/4838/Williams%20the%20defn,%20dimensionalization%20and%20assessment.pdf?sequence=1.

5. Binde P. Why people gamble: A model with five motivational dimensions. *International Gambling Studies*. 2012;13(1):81-97.

6. Roy Kaplan H, Blount WR. The impact of the daily lottery on the numbers game: Does legalization make a difference? *Journal of Gambling Studies*. 1990;6(3):263-74.

7. American Psychiatric Association. *Diagnostic and statistical manual of mental disorders: DSM-5*. 5th ed. Washington, DC: American Psychiatric Publishing; 2013.

8. Substance Abuse and Mental Health Services Association. Risk and protective factors for mental, emotional, and behavioral disorders across the life cycle. Anchorage, AK: U.S. Department of Health and Human Services; 2010. Available from: http://dhss.alaska.gov/dbh/Documents/Prevention/programs/spfsig/pdfs/IOM_Matrix_8%205x11_FINAL.pdf.

9. Blaszcynski A. What do we mean by gambling-related harm? GambleAware Harm Minimization Conference; Dec. 7-8, 2016; London, UK: Available from https://www.about.gambleaware.org/media/1381/alex-blaszczynski.pdf; 2016.

10. Browne M, Langham E, Rawat V, Greer N, Li E, Rose J, et al. Assessing gambling-related harm in Victoria: a public health perspective. Victoria, Australia: Victorian Responsible Gambling Foundation; 2016. Available from: https://www.responsiblegambling.vic.gov.au/information-and-resources/research/recent-research/assessing-gambling-related-harm-in-victoria-a-public-health-perspective.

11. Government of New Zealand. Gambling Act 2003: Part 4 Harm prevention and minimisation, enforcement, and other matter, Subpart 4 - Problem gambling levy. Auckland, New Zealand; 2010, Reprint. Available from: https://www.scribd.com/document/42009621/Gambling-Act-2003-No-51-as-at-07-July-2010-Public-Act-New-Zealand-Legislation.

2. Discussion of Gambling-Specific Factors Contributing to Harmful Gambling

This section discusses four categories of Gambling-Specific factors (gambling environment, gambling exposure, gambling types, and gambling resources) depicted in the Framework. The factors represent major concepts or themes in gambling studies and are relevant across the four categories of General Factors in the Framework. We provide a definition and description of each category of factors in separate subsections below.

2.1 GAMBLING ENVIRONMENT

The environment in which a person lives can have an impact on the nature and frequency of gambling activity, which also impacts the degree of resulting gambling-related harm. In this section we discuss the gambling environment, which covers a broad set of factors including economics, the socio-political environment, public policy, and culture of social responsibility. It is important to note that each jurisdiction is subject to different policies and regulations that can vary both within and between countries. What follows describes policies and issues that are relatively common among many western countries.

To date there has not been sustained research attention paid to links between factors related to the gambling environment and levels of harmful gambling. This can be attributed – at least partially – to the fact that government and industry resources dedicated to reducing harm from gambling have largely been focused on the individual, rather than on the community or society in general. A systematic review of socioeconomic impact studies of gambling identified 492 studies (only 60% of these were empirical investigations), which mainly examined government revenue, employment, harmful gambling, and non-gambling business revenue.[1] Fewer than 10% of the studies examined impacts in the areas of regulatory costs, infrastructure, quality of life, inequality, property values, or business starts and failures. Consequently, more research is needed on the macroeconomic, microeconomic, and socio-political forces that shape gambling provision.

Gambling is a commercial activity that is largely controlled and regulated by governments, but also driven to some extent by complex market forces that determine supply and demand and, ultimately, the nature, availability, and accessibility of various forms of gambling within a specific jurisdiction. State-owned gambling companies have to meet the challenge of balancing responsible provision of gambling (which in the European Community (EC) legislative framework is one of the acceptable reasons for national restrictions of the gambling market) and commercialism, which enables competition with foreign-based, privately-owned Internet gambling companies. The practices and procedures adopted by the industry in developing, configuring, advertising, and marketing gambling products are often at odds with corporate social responsibility objectives. Economic tensions exist between the commercial reality of gambling's intra- and inter-sector competition, and community pressures to reduce gambling-related harms on individuals, families, and the wider society.

Exposure to gambling is dependent upon a number of factors. Online gambling is readily available to anyone with an internet connection and a mobile phone, computer, or tablet. In some jurisdictions, online gambling constitutes a large part of the gambling market.

In Sweden, for example, half of the market was online gambling in 2018.[2] Close to 70% of those who called the Swedish helpline for problem gamblers in 2017 had problems specifically with online casinos and online slots.[3] For land-based forms of gambling, factors related to exposure can include the geographic distribution and density of gambling outlets; the physical characteristics of venues (including attractiveness, safety, and social acceptability of venue surroundings); the types of gambling products offered at venues; and the kinds of additional recreational facilities co-located with gambling venues. These concepts are discussed in detail in Section 2.2 Gambling Exposure.

There is evidence that gambling harm is more common in areas closer to land-based gambling venues. Further, research reveals an almost linear relationship between density of Electronic Gambling Machines (EGMs) and disadvantaged socioeconomic regions. Changes that may contribute to reduced harms include reducing the per capita density of EGMs and gambling outlets; restricting the distribution of gambling opportunities to a limited number of venues; restricting hours of operation; and limiting smoking and alcohol availability to gambling patrons.

2.1.1 ECONOMICS

MACROECONOMICS

Macroeconomics refers to the general analysis of economic variables within an *economy* or large group of individuals, as well as government policies that may affect them. Macroeconomic variables are aggregates, such as unemployment rates and economic growth. In the gambling literature, studies have examined the economic growth effects of casinos and their impacts on employment, wages, and tax revenues. Other types of legalized gambling, such as horse racing, typically have relatively minor impacts, and have not been the focus of substantial economic research.

Policy makers typically look to gambling as a public policy tool to create economic development, employment, and tax revenues. Several studies have examined the factors that explain the adoption of legalized gambling, particularly in the United States. There is a vast literature that has examined the adoption of state lotteries.[4] The literature has shown that lotteries are typically designed in a way to maximize revenue to the state.[5] Fiscal stress appears to be a key determinant of casino adoption in the United States,[6] and economic development related stress, such as unemployment, explains casino adoption elsewhere in the world.[7]

As legalized gambling spreads across North America and the rest of the world, our understanding of the macroeconomic impacts of gambling continues to change. In order to understand how the industry has developed recently, and its impact on regional economies, it is useful to have a foundation in the economics of lotteries and casinos. A paper by Clotfelter and Cook[8] and another by Eadington[9] provide such foundations for lotteries and casinos, respectively.

Casinos began their spread in the United States in the early 1990s. This spread was a catalyst for much of the early research on the economic impacts of casinos. Many of the early studies that shaped the literature and political debate focused on how casinos may "cannibalize" other industries, resulting in no net economic benefit in jurisdictions that adopt casinos.[10-13] These studies presented strong conclusions about the

likely negative impacts of casinos, but did not provide any meaningful empirical evidence. Despite these warnings, governments continued to legalize casinos.

Given the spread of casinos, the academic research on their impacts is surprisingly sparse. Several studies have examined general or aggregate economic effects of casinos, including economic growth effects and effects on housing and business prices.[14-16] The literature here suggests that casinos have at least a modestly positive impact on economic growth and property prices. This evidence contradicts many of the claims made by casino critics such as Goodman and Grinols.

Policy makers are often concerned with casinos' impacts on employment and wages. Again, on this issue, the literature is somewhat thin. The most comprehensive study to date in the United States suggests that casinos have a modestly positive impact on employment, especially in more rural counties.[17] Recent evidence from Canada, however, suggests that any positive impacts from casinos on employment should be considered to be short-term.[18] The impact of casinos on wage rates has been found to be insignificant at an aggregate level.[17]

Although most of the economics research on the gambling industry has focused on North America, studies have also examined other large jurisdictions, such as the United Kingdom and Australia.[19-21] Obviously, gambling industries also operate in many other countries. However, in many European countries, for example, the brick-and-mortar industry is small and likely has a relatively insignificant economic impact. As a result, the research is much more limited than in other markets.

As noted above, one key reason policy makers look to casinos is because of fiscal stress. Whether casinos are state- or privately-owned, the government's take from casino revenues is a much higher percentage than for most other consumer goods and services. As a result, politicians can expect positive revenue effects from casino legalization. However, some research has examined the net impact of casinos, given there is likely to be some substitution with other types of gambling, particularly lotteries.[22] The findings from such analyses imply that casinos ultimately increase state-level tax revenue. However, one study that examined all U.S. states found that casinos might actually lead to a slight decline in total tax revenue.[23] Evidence has suggested that very low-tax jurisdictions could substantially increase casino tax rates without a large negative impact on casino employment.[24]

It can be argued that lottery and casino taxes represent "optional" taxes, and that such taxes are a politically popular way to help delay or avoid government spending cuts or tax increases. However, there is a large amount of evidence from the lottery literature that the "lottery tax" falls disproportionately on the poor, as they spend a higher proportion of their incomes on the lottery.[8] The same is typically assumed to be true of casino taxes, but there has yet to be good empirical evidence to confirm this.

The research on the harms associated with problematic gambling has come mostly from the psychology and public health perspectives. Little research has been done, however, on how problem gambling can affect a local economy. The exception is with respect to *social costs*, discussed in the Microeconomics section below.

Overall, the empirical evidence from the literature suggests that casinos likely have a modestly positive impact on their local and regional economies. There is little evidence to support the notion that casinos negatively affect the local economy, or that there is a substantially negative *substitution effect* with other local industries.

MICROECONOMICS

Microeconomics refers to the study of individual consumers or businesses, and of government policies that affect particular markets or industries. Many of the microeconomic studies on gambling relate to impacts of gambling on individuals, particularly the "social costs of gambling." Many of the social costs of gambling are attributed to people with gambling problems, and include crime and bankruptcy. Aside from analyzing the social impacts of gambling, some studies from the 1990s attempted to estimate the monetary value of social costs. However, the studies that attempted to do this in the 1990s had many methodological problems.

The relationships between different types of gambling industries have received recent attention because of the development of online gambling technologies. Although the various types of gambling are often seen as substitutes, the relationships among gambling industries are not always consistent across jurisdictions. Nevertheless, the two key industries – casinos and lotteries – have been shown to be substitutes for each other.[25] There is still little evidence on how online gambling will affect the traditional casino industry.[26]

Many of the problems associated with too much gambling are financial in nature. For example, there have been several studies that have examined state-level bankruptcy rates and how they have changed as a result of casino legalization. The findings from the literature suggest that casinos have contributed to modestly higher bankruptcy rates, particularly in counties nearest to casinos.[27] However, recent evidence suggests that this impact has diminished since the mid-1990s.[28]

A much larger literature has examined the relationship between casinos and crime rates. Individuals who have a gambling problem are more likely to engage in crime to finance their gambling. However, whether the introduction of casinos leads to higher crime rates is unclear. One comprehensive study from the United States found that casinos have a large effect on increasing crime.[29] However, other studies have found a much weaker relationship or no relationship at all.[30] How casinos affect crime appears to hinge on how the crime rate is defined. Studies that find casinos cause higher crime rates exclude tourists when calculating the population, while studies that find no crime effect of casinos usually include tourists in their population measure.[31]

Without question, individuals with a gambling disorder can cause harm to themselves and others. Perhaps the most interesting literature in the "economics of gambling" area has related to the social costs of gambling, which include the bankruptcy and crime issues discussed above, but also "costs" such as unpaid debts, decreased work productivity, treatment, and stress on personal relationships. Most researchers acknowledge a distinction between these "social impacts" and "economic impacts," such as employment, wages, and economic growth.

The social costs of gambling are of critical importance because they typically represent the "downside", to be considered along with economic benefits from casinos (e.g., employment and tax revenues). Since these are essential for policy makers to consider, researchers have attempted to provide monetary estimates of the social costs of gambling. One of the most successful attempts at this measurement estimated the annual social cost per pathological gambler (in 1997) at about $9,600 USD.[32] However, monetary estimates have varied greatly, likely due to the fact that different researchers approach the question using different methodologies.[33]

Social cost studies have been controversial because there is little agreement on the definition and proper measurement of social costs.[34] The issue has been the

catalyst for several Canadian conferences (one in Whistler in 2000, and one in Banff in 2006) and research reports.[1, 35, 36] One persistent difficulty with accurately estimating the social costs of gambling is comorbidity. Studies that have attempted to estimate the social costs of gambling typically do not acknowledge the issue, or if they do, have not found a way to partition social costs among the various problems a disordered gambler may experience.[37] Therefore, many social cost estimates are likely to over-value the actual costs attributable solely to gambling problems. Future research will likely examine the impacts of casinos on individuals and markets, as well as the effectiveness of policy changes related to legal casinos.

A different thread of research has focused on how individuals view money and gambling. Gambling can be seen differently than many other consumer goods, as some people develop financial stress as a result of their gambling. Research has examined how the price of gambling can affect its consumption.[38]

Other papers have examined how people's views of money affect the harmful consumption of gambling.[39, 40]

More recently, Richard Thaler's contributions to behavioural economics (e.g., see Thaler[41]) earned him the 2017 Nobel Prize. The result of this is likely to be increased attention to the concepts of behavioural economics, many of which have potentially interesting applications for understanding gambling and problematic gambling behaviours. In *Nudge,* Thaler and Sunstein[42] use the example of casino *self-exclusion* programs (where people enter into an agreement with a gambling venue to ban themselves from entering for a specific time period). Although these programs have been adopted widely to promote responsible gambling (see Section 2.1.5), research on their effectiveness is limited. As Volberg has commented,[43] they could be promoted and monitored more aggressively so that policymakers, operators, and gamblers have more data to understand how well these programs are doing.

2.1.2 SOCIO-POLITICAL ENVIRONMENT

Although people may embrace gambling once they are given the opportunity, commercial interests usually drive the introduction of gambling venues. There is little evidence that community members lobby for the introduction of gambling without the involvement of industry interests. Consistent with microeconomic processes, industry operators decide which products are supplied, and through effective marketing stimulate a demand for them. Consumers then sustain the supply by using the gambling products. Historically, even if state-owned companies did not promote gambling (as in Sweden from 1930-1980), demand for gambling remained strong. This happens even when some forms of gambling are outlawed.[44]

The adoption of gambling in a jurisdiction is the result of social, cultural, and political forces.[45] These forces influence whether gambling is considered a legitimate product, the extent to which gambling is made available, and the degree to which communities may oppose its introduction on the grounds of immorality or harm. These concepts are discussed in more detail in Section 3.1.3 Socio-Cultural Attitudes.

Politics play a crucial role in shaping the gambling environment. Bearing in mind differing political and economic contexts, decisions continue to be influenced by economic pressures, such as responding to international competition or the desire to retain on-shore revenue from online gambling facilities. This is especially the case when increasing numbers of licensed Internet

operators are attracting cross-border participants, and thereby fueling a global expansion of Internet gambling.

Political and economic systems are extremely important in shaping where and how commercial gambling will be offered, as well as which groups are most likely to be labelled as problem gamblers. Unlike other consumer products, legal gambling has been influenced by government decisions rather than economic need. Since the 1980s, some jurisdictions' reluctance to raise taxes has led to the rapid expansion of some forms of gambling to provide an alternative revenue stream. Like some other trends in wealth redistribution, the upward diffusion of wealth through commercial gambling has been accompanied by a downward diffusion of responsibility and victimization as people with fewer financial resources (that could buffer the adverse effects of gambling losses) are more likely to be labelled as problem gamblers.[46]

When new forms of gambling become legal, they reach into society in ways that enhance their legitimacy and acceptance. This is not merely a matter of the de-stigmatization of a formerly "deviant" activity, or a new acceptance of gambling by individuals and communities. Legalization of new forms of gambling is accompanied by major institutional shifts; for example, gambling operations and oversight become part of the routine processes of government.

Some retail operators such as restaurants, hotels, and social clubs, may also come to depend on revenue from gambling to operate profitably. Finally, in some countries gambling industry executives and political action committees became key sources of funding for political parties, elections, and ballot initiatives.[46, 47]

2.1.3 PUBLIC POLICY

Some governments have adopted a broad public health approach for developing gambling policy and regulation. This builds on the success of harm-reduction efforts for products such as alcohol and tobacco. Still, in many cases, the emphasis continues to be on the need to identify and treat people with gambling problems, rather than on the community or policy environment. To be effective, healthy public policy needs to be centered on promoting the health and well-being of the community as a whole, and be based primarily on prevention and reduction of harm. It should also be grounded in evidence, be reflective and responsive to public opinion, and foster public discourse to help improve the community's health and well-being.

Elected officials, governmental bodies, and/or regulations should all play a part in the promotion of evidence-based public policy related to gambling harm. Such policies should include a broad statement of purpose or intent about the role of gambling within the public domain, and clear goals to prevent and reduce harm, and to support and treat those harmed by gambling. Policies should also include methods to monitor implementation and have a structure for and commitment to formal evaluation. Finally, good evidence-based public policies aim to address the scope of gambling activities, types of games, limits on availability, and jurisdictional authority.[48, 49]

There are considerable challenges to developing healthy public policy, including the key issue of gambling revenue. A focus on generating revenue for both government and the private sector may hinder good policy development. The EU, for instance, has recognized this conflict and has enacted legislation that forbids monopolies that are plainly intended to generate revenues for the state. Monopolies are only accepted for public health reasons and for minimizing economic crime, etc.

Studies of gambling expenditure in different jurisdictions have shown that a disproportionately high percentage of overall gambling revenue comes from people with moderate to severe gambling problems.[49-51] The development of strong policies to reduce gambling harm is improved with sufficient separation from political, tax, and commercial influences. In practice, this could mean that policy development and regulation could be handled at a different level of government than gambling revenue management. In other words, decisions on how to allocate gambling revenues (to education, social services, charities, etc.) should be separate from decisions on how to regulate gambling operators.

A parallel issue relates to funding gambling research and concerns about whether funding comes from the same sources that rely on and/or benefit from gambling revenue. Some researchers suggest that receiving research funds from gambling industries is morally and ethically problematic,[52, 53] particularly when considering that a disproportionate amount of gambling revenue comes from people with gambling problems.[49] Although a study by Miller and Michelson[54] did not find direct evidence of the gambling industry trying to influence or censor research results or how they are shared, researchers should carefully consider the ethical issues. Kim and colleagues[55] outline potential concerns:

- Conflict of interest, including explicit or implicit pressure to provide results that favour continued access to resources such as funds, data, and access to gambling venues;
- Suppression of research, specifically findings that are unfavourable to the gambling industry;
- Risk to the researchers' reputations for being impartial;
- Influence on how the problem or research question is framed, e.g., a focus on the person with gambling problems, rather than on structural characteristics of machines;
- Restrictions on publishing, including lag times before researchers can make their results public; and,
- A lack of disclosure of funding sources.

On the other hand, there may be benefits to working closely with the gambling industry. These could include stronger relationships to translate and act on research findings, and for access to participants and data, which increases the opportunity for on-site studies.[55] The Canadian Code of Ethics for Psychologists[56] provides guidance for any study: respect for dignity of persons (e.g., disclosure of funding sources in the informed consent); responsible caring (do benefits outweigh potential risks?); integrity in relationship (e.g., clearly outline terms of funding including any restrictions); and responsibility to society (e.g., freedom to disseminate, recognizing potential for misuse of results). Further, a number of international gambling researchers are working toward a common code of ethics for gambling researchers.[57]

In some jurisdictions such as Canada, research funding flows through an intermediary body in order to reduce potential influence on the research; however, this may present challenges related to obscuring the ultimate source of the funds and potentially masking related ethical considerations. Making funding for gambling research and evaluation completely separate from gambling revenue generation and collection would support a comprehensive, policy-oriented research agenda. An example of such separation is the Australian Gambling Research Centre (AGRC) within the Australian Institute of Family Studies (an

independent statutory body). The AGRC is funded by the Australian Commonwealth Government, which receives no direct revenue from gambling.

The level of control of gambling operations also varies. In some regions, state-controlled gambling companies have a monopoly or near monopoly over the supply of some types of gambling products (e.g., Canada, Norway, Finland). Some politicians and regulators believe that state-controlled gambling companies with a monopoly are more effective in minimizing harmful gambling than private companies in a competitive market. This belief rests upon the assumption that a state-owned company will prioritize responsible gambling measures since it does not need to maximize profit. 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, and Hendrie;[58] Popova et al.;[59] and, Wagenaar and Holder[60]).

If the government receives a substantial amount of revenue from gambling, however, it may constrain public policy that aims to reduce harm. This is especially likely if other tax revenue is limited. In contrast, there are also arguments for effective harm reduction through appropriate regulation of private gambling companies in a competitive market. While both positions may have merit, there is currently no research that supports either of them.[61]

Policies are likely to be more effective if they are based on credible evidence, and there are examples from around the world to support this view.[21, 62, 63] Good policies would be based on comprehensive, rigorous, research evidence and evaluation to ensure that (a) measures introduced are effective, (b) benefits outweigh the costs, and (c) unintended consequences are minimized.

The evidence base itself would ideally be constructed from multiple data sources. The use of multiple data sources and methods of analysis enhances the validity and transferability of findings.[64] However, it is important to acknowledge that this type of rigorous evidence can be difficult to construct, and it is unlikely that any single piece of evidence will be sufficient. Further, even if such evidence existed, policy decisions may still be made with imperfect evidence.[62]

The Australian Productivity Commission (APC) – an independent research agency that provides advice to governments on social, economic, and environmental issues – suggests that the level of evidence needed to support a policy initiative should be more akin to the balance of probability, such as required in civil law, rather than the criminal standard of proof 'beyond all reasonable doubt'.[21] The Commission has also argued that gambling harm-reduction policy should focus on two broad areas: (a) enhancing self-responsibility by strengthening individual capacity for informed choice, and (b) reducing the risk by adjusting features of the gambling environment that have been shown to be hazardous.[21] Further, the commission emphasizes harm prevention/reduction and consumer protection for *all* gamblers.

Gainsbury and colleagues reviewed evidence related to best practice policies to recommend international harm minimization guidelines for land-based and Internet gambling.[65] Their recommendations include (1) imposing age limits (at least 18 years, preferably 21-25 years), for both land-based and Internet gambling; and, (2) licensing systems that require responsible gambling and consumer protection and encourage data sharing for both land-based and Internet gambling. They also found evidence of low-to-moderate effectiveness for pricing practices to minimize losses (e.g., bet size and limit setting) for both land-based and Internet gambling; taxation levels that

allow legitimate Internet gambling operators to compete with the illegal market; and, making brief intervention treatment for people with gambling problems available in person and online. Information was inconclusive around hours of operation, particularly for Internet gambling.

2.1.4 CULTURE OF SOCIAL RESPONSIBILITY

Corporations involved in marketing and selling gambling products with the potential to create harm have a responsibility to maintain standards of ethical practice. This means adopting a corporate philosophy that balances economic expansion and profits with socially-responsible practices that reduce harm. This includes manufacturers of products such as gaming machines and Internet-based gambling, and operators of venues and marketing companies.

Manufacturers are confronted with the dilemma of designing and constructing devices that are popular but do not lead to addiction. Research shows that sounds, lights, near misses, and losses disguised as wins are features of gaming products that serve to generate excitement and contribute to continued gambling.

Similarly, venue operators have a corporate responsibility to ensure that people are not offered incentives to gamble, or provided with alcohol (which can impair judgment). They should also be responsible for identifying signs of excessive/harmful gambling and for intervening in a timely manner to prevent excessive losses. Although not established by law in some countries, there is a moral obligation for corporations and operators to maintain a duty of care to not exploit vulnerable people.

Overall, attitudes toward social responsibility depend on the local economic frameworks and political structures. Capitalist economies emphasize free-market competition and individual responsibilities, and are less likely to support regulatory policies that restrict economic expansion. Governments that favour free markets tend to support interventions that aim to manage harm by influencing demand (or consumer behaviour) rather than by changes to supply.[45] Similarly, they often promote responsible gambling and consumer protection through regulation and by funding treatment services. They focus on a culture of responsibility that promotes self-regulation and personal responsibility for decision making. A broader focus would include personal, corporate, and social responsibility.

2.1.5 RESPONSIBLE GAMBLING

The global expansion of gambling during the past three decades occurred with relatively little regard for effective consumer protection and responsible gambling safeguards. The primary legislative concerns were to keep gambling activities free from criminal involvement and prevent access to children. Governments have also legislated and regulated other aspects of gambling and its promotion. During this period, community organizations, clinicians, and academics, among others, increasingly called for the introduction of measures to reduce gambling-related harm. Governments and gambling providers responded and have

implemented policies and practices with this intent.[66] Approaches include information and education campaigns, helpline and treatment services, self-exclusion programs, behavioural tracking, warning messages, venue staff training and intervention with at-risk gamblers, participant pre-commitment, and the modification of EGM parameters. In Scandinavia, two gambling companies have recently introduced fixed loss limits for their customers: Norsk Tipping (about CAD 3,100 per month) and the international company PAF (about CAD 44,500 per year).

Responsible gambling (RG) is a broad and somewhat vague term.[67] It is generally applied to aspects of gambling provision that are intended to help reduce harm to participants and the wider community. A particular approach to RG, the Reno Model, has had a major influence on measures taken by governments, regulators, and the gambling industries. A recent review concluded that although RG programmes have been widely introduced, their effectiveness and impact remains uncertain.[68] In large part this is because only a small number of methodologically sound evaluations have been conducted. Reviews of the wider prevention and RG literature[51, 66] also conclude that the evidence base is thin. These reviews additionally conclude that the most commonly implemented measures appear to be those least likely to be effective. On a positive note, they add that most are likely to be effective to some extent and that multiple interventions sustained over time may work together and have greater impact.

The Reno Model was outlined in a series of articles published between 2004 and 2015.[69-72] The model rests on a number of assumptions. These include the view that gambling is an acceptable leisure or recreational activity, that a small number of people develop gambling problems, and that policies and practices are required to help people to make informed choices about their gambling activities and avoid harm. Additionally, people who gamble, governments, gambling industries, and researchers are expected to collaborate to promote responsible gambling. Gamblers are seen as having responsibility for learning about gambling and participating in a way that they can afford. Gambling industries have a duty of care. This includes an expectation that they will provide information about gambling products and encourage gambling within affordable limits. It extends to an expectation that vulnerable citizens will not be exploited. Governments are considered to have responsibility for regulating some industry practices and support measures to help people with gambling problems and promote responsible gambling. The role of researchers is to evaluate RG initiatives to ensure that they are effective and don't undermine the enjoyment of people without gambling problems.

It remains unclear precisely what role the Reno Model played in the adoption of RG and other approaches to reduce gambling-related harm. However, it seems highly likely that the Reno Model influenced gambling legislation in many jurisdictions and, to varying degrees, has been widely adopted by gambling providers. It also appears to have strongly influenced the direction of research on gambling and problem gambling. The most commonly introduced responsible gambling measures include education and public awareness campaigns, counselling and other support services, and modification of gambling environments.

Recently the Reno Model has been criticised for a variety of reasons. The most comprehensive critique is provided by Hancock and Smith.[73] While acknowledging that the model helped raise awareness of the need to develop responsible gambling measures and contributed to their implementation, they concluded that it has major deficiencies. Shortcomings include its narrow focus,

which places emphasis on individual responsibility and people with gambling problems. They also believe the model has insufficient concern for public safety and deflects attention from harmful gambling policies, formats, and environments. The focus on people with gambling problems is also seen as a means to distract attention from a much wider spectrum of gambling-related harm. Hancock and Smith go further and maintain that the narrow emphasis has played into the hands of governments and the gambling industries that have a vested interest in maximising profits and taxation while giving the appearance of doing something to reduce harm. This assessment appears to be in keeping with reviews that conclude the most widely implemented measures are those least likely to be effective.

Hancock and Smith[73] call for responsible gambling to be reformulated with consumer protection and safety at the core. This RG-Consumer Protection approach has a wider focus that includes addressing structural, power, and vested interests. Additionally, it incorporates major public health principles, consumer protection, regulatory transparency, and independent research.

A number of people responded to Hancock and Smiths' critique of the Reno Model and their RG-Consumer protection alternative. Apart from the Reno Model authors,[74] who maintain that "the facts of the Reno Model remain unassailable" and "endorse their original premises and postulates," these responses have generally agreed with their critique. Some endorsed the stronger consumer protection and public health emphasis that incorporated existing RG approaches.[75, 76] Others were of the view that the reformulated approach does not go far enough in addressing gambling-related harm and that the Reno Model is either not redeemable or would require major transformation of its underlying assumptions.[77, 78] Abbott[75] supported the call for greater emphasis on regulation and changing gambling products, industry operations, and practices, but maintained that reducing gambling exposure and participation through supply and demand reduction are unlikely to be sufficient on their own. In a number of jurisdictions with mature gambling markets, participation has dropped markedly but harm has plateaued. Further harm reduction may require interventions that address the wider spectrum of risk and protective factors including economic and social disparities, deprivation, employment, educational attainment, housing, and social capital. These factors also contribute to associated harms and morbidities including mental health and substance misuse disorders.

2.1.6 SOCIAL AND ECONOMIC IMPACTS

Impact studies are often carried out to assess the effectiveness of new policies or initiatives on a group of people or organizations. Impact studies typically focus on changes within the economic or social realms that occur as a result of new policies or initiatives. These studies can inform policy makers about the effects of new policies on people's everyday lives.

Hundreds of studies of the impacts of changes in the availability of gambling have been conducted internationally since the 1970s. However, many of these studies have been theoretically or methodologically flawed. A systematic review of socioeconomic impact studies identified 492 such studies, but found that only 293 were empirical investigations and only 51 of the studies could be rated as good or excellent.[1]

Analysis of the 293 empirical investigations found that the most reliable positive impact of gambling across all forms is an increase in government revenue. Enhancement of public services (e.g., health, education, social security) is another fairly reliable impact of gambling introductions. The introduction of new gambling venues reliably increases infrastructure value, and often has beneficial impacts on other businesses in the local area. Overall employment may also be improved (as long as a significant portion of the patron base is from outside the local area). Gambling introductions reliably increase the entertainment and leisure options available to people. Finally, they can occasionally contribute to an increase in property values.

The main negative impact of the introduction of new gambling opportunities is an increase in problem gambling and its related harms (e.g., bankruptcy, divorce, suicide, treatment numbers). The bulk of these impacts tend to be non-monetary in nature, because only a minority of people with gambling problems seek or receive treatment or have involvement with police, child welfare, or employment agencies. The impact of gambling on crime is particularly difficult to disentangle and the results are mixed. Research is also somewhat mixed when it comes to understanding the impact of gambling introductions on socioeconomic inequality, quality of life, and attitudes toward gambling. Among the most predictable negative impacts of the introduction of gambling are increases in regulatory and infrastructure costs.

Different impacts are associated with different types of gambling.

- Forms of gambling that generate the most revenue (e.g., casinos, EGMs) and that are most likely to be delivered by government (e.g., lotteries) have the most reliable positive impacts on government revenue and accompanying public services. Still, forms of gambling delivered by government tend to have more regulatory and administrative costs. There is not yet enough research to indicate whether this is true of online gambling as well.
- Forms of gambling that are venue-based are the only gambling types with the potential to add infrastructure value and impose infrastructure costs. Destination casinos have the greatest potential to create broad economic benefits by bringing in revenue from outside the local area, while EGMs and lotteries have greater potential to negatively impact local businesses by diverting money from these businesses.
- Continuous forms of gambling (e.g., casino table games, EGMs, Internet gambling) have greater potential to increase problem gambling, while casinos have the greatest potential to increase crime.
- EGMs are the least likely to increase overall employment while horse racing and casinos are the forms most likely to increase employment.
- EGMs and Internet gambling have the greatest potential for negatively affecting attitudes toward gambling.

Destination casinos have the greatest potential for improving the quality of life for impoverished communities, while non-destination casinos and EGMs have the greatest potential for decreasing quality of life.

The impacts of gambling also vary considerably between jurisdictions and depend on a number of factors. These factors include the extent to which gambling opportunities have increased, the type of gambling being introduced, the length of time that gambling has been legally available prior to the introduction of additional or new forms, and whether patrons and revenues are locally derived or come from outside the jurisdiction. Other factors include the type and extent of gambling opportunities in neighbouring jurisdictions, the strength and effectiveness of policies and programs intended to mitigate the negative effects of gambling, baseline levels of community impoverishment, the level at which the impacts are examined, the length of time that impacts are evaluated, and how gambling revenues are ultimately distributed.

2.1.7 LOW-RISK LIMITS

The recent studies described in Section 5 Longitudinal Cohort Studies have extended findings from *cross-sectional* surveys (i.e., surveys where information is collected at one time-point only). They indicate that a variety of gambling participation measures predict future onset of at-risk and problem gambling behaviour. While non-gambling factors are also important, when considered together in multivariate analyses, gambling participation measures are usually the leading predictors. For example, in the New Zealand National Gambling Study (NGS) frequent gambling participation, especially in *continuous* forms of gambling including EGMs, card games, and sports betting, was a strong predictor of at-risk and problem gambling across the four *waves* (i.e., separate points in time when information is collected from the same people).[79] Additionally, higher overall gambling expenditure and longer average EGM sessions were important predictors, as were making regular short-term speculative investments and participation in gambling-type games not for money. While these two latter activities are not regarded as gambling for regulatory purposes, they contribute to the development of at-risk and problematic gambling. Additional risk factors included Māori and Pacific ethnicity, low household income, high deprivation, exposure to multiple life events, high psychological distress, and cannabis use. Many of these factors, like the gambling participation measures, can be modified and thus present potential targets for harm prevention and reduction.

Given the consistent finding from longitudinal studies that intensity of gambling engagement per se is a strong predictor of future problems and harm, there is some interest in exploring whether or not 'low-risk' or 'safe' gambling limits can be identified. Many countries have developed and promoted low-risk alcohol consumption guidelines, though they vary across jurisdictions and include qualifications for particular population groups. Currie et al.[80] examined how relationships between gambling intensity and harm might be used to develop low-risk gambling limits. They used three measures – gambling frequency, gambling expenditure, and percentage of household income spent on gambling – to develop risk thresholds. These thresholds were subsequently replicated in a separate study.[81] Other investigators have also identified thresholds. They differ, to varying degrees, from those in the initial Canadian studies.[82] A limitation of these studies is that all used cross-sectional data.

Recently, Currie et al.[82] derived a new set of low-risk limits using data from two Canadian longitudinal gambling studies.[83, 84] The findings from the two studies were very similar. The optimal low-risk limits were approximately $75 CAN gambling expenditure per month, 1.7% of household income spent on gambling, and gambling eight times per month or less. Adults who exceeded any of the low-risk limits were four times more likely to experience harm in future. The optimal limits in this study were higher than those obtained from the investigator's earlier cross-sectional studies and their predictive power was lower. Together, the three factors explained less than 20% of the harm variance.

While the foregoing research has contributed to understanding relationships between gambling participation and harm, there are significant challenges in identifying low-risk guidelines or limits. In contrast to alcohol, there is no standard gambling unit. As mentioned, there is considerable variation between the 'toxicity' of various gambling forms. Gambling forms and settings defy simple classification.[85] Including the level of participation in particular gambling forms may be required to more accurately predict future harm. Statistical analyses have found that both the type of gambling and general gambling measures uniquely predict at-risk and problem gambling behaviour.[79, 86, 87] As mentioned, while participation measures are generally the dominant predictors of harm, various other non-gambling factors also contribute, in some cases strongly so. It may be that different thresholds apply to particular gambling forms and to different population groups including people with past gambling problems, and other high-risk groups such as people experiencing mental health and addiction disorders, youth, indigenous, and some migrant groups.

Currently, when compared to the alcohol field, assessing links between gambling 'consumption' and the wide spectrum of gambling related harm is in its infancy. In particular, there is a lack of research examining harms that accumulate and persist over long time-spans. Without this knowledge it would seem premature to advocate the endorsement of low-risk guidelines. Additionally, the concept of guidelines implies that there are safe or relatively safe gambling levels and, perhaps, that it is the responsibility of participants to know and adhere to them. These beliefs are central to the Reno Model of responsible gambling as described in Section 2.1.5 Responsible Gambling. This model has been contested on the grounds that its emphasis on individual responsibility takes the focus away from the responsibilities of the gambling industries and governments to prevent harm and exercise a duty of care. Regardless of these considerations, including the possibility that there are no safe or low-risk limits for many gambling forms and population groups, research investigating limits is addressing a neglected area and helping to increase our understanding of the risks associated with various gambling activities and participation intensities.

REFERENCES

1. Williams RJ, Rehm J, Stevens RMG. The social and economic impacts of gambling. Calgary, AB: Canadian Consortium for Gambling Research; 2011. Available from: https://www.uleth.ca/dspace/bitstream/handle/10133/1286/SEIG_FINAL_REPORT_2011.pdf.

2. Lotteriinspektionen. Hälften av allt spel om pengar sker på internet [Half of all gambling takes place on the Internet]. 2018. Available from: https://www.lotteriinspektionen.se/om-oss/statistik/statistiknytt/svenska-spel-tar-andelar-pa-marknaden-for-spel-pa-internet/.

3. Centrum för Psykiatriforskning. Stödlinjen för spelare och anhöriga, årsrapport 2017 [The problem gambling helpline, yearly report 2017]. Stockholm, Sweden; 2018. Available from: http://dok.slso.sll.se/CPF/Stodlinjen/Stodlinjens_arsrapport_2017_180331.pdf

4. Alm J, McKee M, Skidmore M. Fiscal pressure, tax competition, and the introduction of state lotteries. *National Tax Journal*. 1993;46(4):463-76.

5. Garrett TA. The Leviathan lottery? Testing the revenue maximization objective of state lotteries as evidence for Leviathan. *Public Choice*. 2001;109(1-2):101-17.

6. Calcagno PT, Walker DM, Jackson JD. Determinants of the probability and timing of commercial casino legalization in the United States. *Public Choice*. 2009;142(1):69.

7. Richard B. Diffusion of an economic development policy innovation: explaining the international spread of casino gambling. *Journal of Gambling Studies*. 2010;26(2):287-300.

8. Clotfelter CT, Cook PJ. On the economics of state lotteries. *Journal of Economic Perspectives*. 1990;4(4):105-19.

9. Eadington WR. The economics of casino gambling. *Journal of Economic Perspectives*. 1999;13(3):173-92.

10. Goodman R. Legalized gambling as a strategy for economic development. Amherst, MA: United States Gambling Study; 1994. Available from: https://prism.ucalgary.ca/ds2/stream/?#/documents/67a55ebe-588f-4491-8d50-1c86b8ed7f19/page/1.

11. Grinols EL. Bluff or winning hand? Riverboat gambling and regional employment and unemployment. *Illinois Business Review*. 1994;51(1):8.

12. Grinols EL, Omorov JD. Development or dreamfield delusions: Assessing casino gambling's costs and benefits. *Journal of Law and Commerce*. 1996;16:49.

13. Kindt JW. The economic impacts of legalized gambling activities. *Drake Law Review*. 1993;43:51.

14. Walker DM, Jackson JD. New goods and economic growth: Evidence from legalized gambling. *The Review of Regional Studies*. 1998;28(2):47-70.

15. Wenz M. The impact of casino gambling on housing markets: a hedonic approach. *Journal of Gambling Business and Economics*. 2007;1(2):101-20.

16. Wiley JA, Walker DM. Casino revenues and retail property values: The Detroit case. *Journal of Real Estate Finance and Economics*. 2011;42(1):99-114.

17. Cotti C. The effect of casinos on local labor markets: A county level analysis. *Journal of Gambling Business and Economics*. 2008;2(2):17-41.

18. Humphreys BR, Marchand J. New casinos and local labor markets: Evidence from Canada. *Labour Economics*. 2013;24:151-60.

19. Crane Y. New casinos in the United Kingdom: Costs, benefits and other considerations: University of Salford; 2006.

20. Forrest D. An economic and social review of gambling in Great Britain. *The Journal of Gambling Business and Economics*. 2013;7(3):1-33.

21. Productivity Commission. Gambling. Canberra, Australia: Government of Australia; 2010.Report No.: 50 Available from: https://www.pc.gov.au/inquiries/completed/gambling-2010/report.

22. Borg MO, Mason PM, Shapiro SL. The cross effects of lottery taxes on alternative state tax revenue. *Public Finance Quarterly*. 1993;21(2):123-40.

23. Walker DM, Jackson JD. The effect of legalized gambling on state government revenue. *Contemporary Economic Policy*. 2011;29(1):101-14.

24. Philander KS, Bernhard BJ, Wimmer BS, Singh AK, Eadington WR. U.S. casino revenue taxes and short-run labor outcomes. *Journal of Policy Modeling*. 2015;37(1):35-46.

25. Walker DM, Jackson JD. Do U.S. gambling industries cannibalize each other? *Public Finance Review*. 2008;36(3):308-33.

26. Philander KS. The effect of online gaming on commercial casino revenue. *UNLV Gaming Research and Review Journal*. 2011;15(2):23.

27. Barron John M, Staten Michael E, Wilshusen Stephanie M. The impact of casino gambling on personal bankruptcy filing rates. *Contemporary Economic Policy*. 2008;20(4):440-55.

28. Grote Kent R, Matheson Victor A. The impact of state lotteries and casinos on state bankruptcy filings. *Growth and Change*. 2013;45(1):121-35.

29. Grinols EL, Mustard DB. Casinos, crime, and community costs. *Review of Economics and Statistics*. 2006;88(1):28-45.

30. Reece William S. Casinos, hotels, and crime. *Contemporary Economic Policy*. 2010;28(2):145-61.

31. Walker DM. *Casinos and crime in the U.S.A: Chapter 17, Handbook on the economics of crime*. Cheltenham, UK: Edward Elgar Publishing; 2010. p. 488-517

32. Thompson WN, Gazel R, Rickman D. Social and legal costs of compulsive gambling. *Gaming Law Review*. 1997;1(1):81-9.

33. Grinols EL. *Gambling in America: Costs and benefits*. Cambridge, UK: Cambridge University Press; 2004.

34. Walker DM, Barnett AH. The social costs of gambling: An economic perspective. *Journal of Gambling Studies*. 1999;15(3):181-212.

35. Anielski M, Braaten A. The socio-economic impact of gambling (SEIG) framework: An assessment framework for Canada: In search of the gold standard. Canada: Inter-Provincial Consortium for the Development of Methodology to Assess the Social and Economic Impact of Gambling; 2008. Available from: http://anielski.com/Documents/SEIG%20Framework.pdf.

36. Humphreys BR, Soebbing BP, Wynne H, Turvey J, Lee YS. Final report to the Alberta Gaming Research Institute on the socio-economic impact of gambling in Alberta. Calgary, AB: Alberta Gaming Research Institute; 2011. Available from: https://prism.ucalgary.ca/ds2/stream/?#/documents/51c1449b-5fc3-4870-9637-551d64ae89a3/page/1.

37. Walker DM. Methodological issues in the social cost of gambling studies. *Journal of Gambling Studies*. 2003;19(2):149-84.

38. Gallet CA. Gambling demand: a meta-analysis of the price elasticity. *Journal of Gambling Business and Economics*. 2015;9(1):12-22.

39. Tabri N, Wohl MJA, Eddy KT, Thomas JJ. Me, myself and money: Having a financially focused self-concept and its consequences for disordered gambling. *International Gambling Studies*. 2016;17(1):30-50.

40. Robillard C, Kairouz S, Monson E. Win or lose: Negotiating meaning of time and money within three gambling settings. *Journal of Gambling Issues*. 2017;36:164-82.

41. Thaler RH. *Misbehaving: The making of behavioral economics*. New York, NY: W.W. Norton and Company; 2015.

42. Thaler RH, Sunstein CR. *Nudge: Improving decisions about health, wealth, and happiness*: Penguin Books; 2009.

43. Volberg R. How can we improve gambling self-ban programs? A gambling addiction expert answers [Internet]. Blaz J, editor: Penguin. 2009 May 8, 2009. [cited 2018]. Available from: http://nudges.org/?s=volberg.

44. Downs C. Selling hope: Gambling entrepreneurs in Britain 1906–1960. *Journal of Business Research*. 2015;68(10):2207-13.

45. Chambers K. *Gambling for profit: Lotteries, gaming machines, and casinos in cross-national focus*. Toronto, ON: University of Toronto Press; 2011.

46. Volberg RA, Wray M. Legal gambling and problem gambling as mechanisms of social domination? Some considerations for future research. *American Behavioral Scientist*. 2007;51(1):56-85.

47. Abbott MW, Volberg RA. Gambling and problem gambling in the community: An international overview and critique. Wellington, New Zealand: Department of Internal Affairs Wellington; 1999. Report No.: 0478092482.

48. Babor T, Caetano R, Casswell S, Edwards G, Giesbrecht N, Graham K, et al. *Alcohol: no ordinary commodity: Research and public policy*. 2nd Edition ed. Oxford, UK: Oxford University Press; 2010.

49. Productivity Commission. Australia's gambling industries: Inquiry report, volume 2: Part D. Canberra, Australia: Government of Australia; 1999 Report No.: 10 Available from: https://www.pc.gov.au/inquiries/completed/gambling/report/gambling2.pdf.

50. Rintoul AC, Livingstone C, Mellor AP, Jolley D. Modelling vulnerability to gambling related harm: How disadvantage predicts gambling losses. *Addiction Research and Theory*. 2012;21(4):329-38.

51. Williams RJ, Wood RT. The proportion of Ontario gambling revenue derived from problem gamblers. *Canadian Public Policy*. 2007;33(3):367-87.

52. Adams PJ. Redefining the gambling problem: The production and consumption of gambling profits. *Gambling Research: Journal of the National Association for Gambling Studies (Australia)*. 2009;21(1):51-4.

53. Livingstone C, Woolley R. Risky business: A few provocations on the regulation of electronic gaming machines. *International Gambling Studies*. 2007;7(3):361-76.

54. Miller R, Michelson G. Fixing the game? Legitimacy, morality policy and research in gambling. *Journal of Business Ethics*. 2013;116(3):601-14.

55. Kim HS, Dobson KS, Hodgins DC. Funding of gambling research: Ethical issues, potential benefit and guidelines. Journal of Gambling Issues [Internet]. 2016; (32)111-32 pp.]. Available from: https://doi.org/10.4309/jgi.2016.32.7.

56. Canadian Code of Ethics for Psychologists. Ottawa, ON: Canadian Psychological Association; 2000.

57. AUT Gambling and Addictions Research Centre. Enriching and growing gambling studies - Gambling studies code of ethics. Think Tank Newsletter [Internet].[cited:6. Available from: https://gallery.mailchimp.com/b75a2666bec4495a3747fd7cd/files/321de837-3b69-4dce-9b82-cf63305611ac/Think_Tank_2018_Newsletter_16_23052018.pdf.

58. Miller T, Snowden C, Birckmayer J, Hendrie D. Retail alcohol monopolies, underage drinking, and youth impaired driving deaths. *Accident Analysis and Prevention*. 2006;38(6):1162-7.

59. Popova S, Patra J, Sarnocinska-Hart A, Gnam WH, Giesbrecht N, Rehm J. Cost of privatisation versus government alcohol retailing systems: Canadian example. *Drug and Alcohol Review*. 2012;31(1):4-12.

60. Wagenaar AC, Holder HD. The scientific process works: seven replications now show significant wine sales increases after privatization. *Journal of Studies on Alcohol*. 1996;57(5):575-6.

61. Planzer S, Wardle H. *The comparative effectiveness of regulatory approaches and the impact of advertising on propensity for problem gambling*. London, UK: Responsible Gambling Fund; 2011.

62. Banks G. Evidence and social policy: The case of gambling. Adelaide, AU: South Australian Centre for Economic Studies; 2011. Available from: https://www.pc.gov.au/news-media/speeches/evidence-and-social-policy-gambling/evidence-and-social-policy-gambling.pdf.

63. Livingstone C, Rintoul A, Francis L. What is the evidence for harm minimisation measures in gambling venues? *Evidence Base*. 2014;2:1-24.

64. Creswell, JW *Research design: Qualitative, quantitative, and mixed methods approaches*: Sage Publications; 2009.

65. Gainsbury SM, Blankers M, Wilkinson C, Schelleman-Offermans K, Cousijn J. Recommendations for international gambling harm-minimisation guidelines: comparison with effective public health policy. *Journal of Gambling Studies*. 2014;30(4):771-88.

66. Williams RJ, West BL, Simpson RI. Prevention of problem gambling: A comprehensive review of the evidence and identified best practices. Guelph, ON: Gambling Research Exchange Ontario; 2012. Available from: https://www.uleth.ca/dspace/handle/10133/3121.

67. McMillen J, McAllister G. Responsible gambling: legal and policy issues. *3rd National Gambling Regulation Conference ….* 2000.

68. Ladouceur R, Shaffer P, Blaszczynski A. Responsible gambling: A synthesis of the empirical evidence. *Addiction Research and Theory*. 2017;25(17):225-35. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/a-review-of-existing-evidence-for-responsible-gambling-practices

69. Blaszczynski A, Collins P, Fong D, Ladouceur R, Nower L, Shaffer HJ, et al. Responsible gambling: general principles and minimal requirements. *Journal of Gambling Studies*. 2011;27(4):565-73.

70. Blaszczynski A, Ladouceur R, Nower L, Shaffer HJ. Informed choice and gambling: Principles for consumer protection. *Journal of Gambling, Business and Economics*. 2008;2(1):103-18.

71. Blaszczynski A, Ladouceur R, Shaffer HJ. A science-based framework for responsible gambling: The Reno Model. *Journal of Gambling Studies*. 2004;20(3):301-17.

72. Collins P, Blaszczynski A, Ladouceur R, Shaffer HJ, Fong D, Venisse JL. Responsible gambling: Conceptual considerations. *Gaming Law Review and Economics-Regulation Compliance and Policy*. 2015;19(8):594-9.

73. Hancock L, Smith G. Critiquing the Reno Model I-IV international influence on regulators and governments (2004–2015)— the distorted reality of "responsible gambling". *International Journal of Mental Health and Addiction*. 2017;15(6):1151-76.

74. Shaffer HJ, Blaszczynski A, Ladouceur R. Truth, alternative facts, narrative, and science: what is happening to responsible gambling and gambling disorder? *International Journal of Mental Health and Addiction*. 2017;15(6):1197-202.

75. Abbott MW. Beyond Reno: A critical commentary on Hancock and Smith. *International Journal of Mental Health and Addiction*. 2017;15(6):1177-86.

76. Delfabbro P, King DL. Blame it on Reno: A commentary on Hancock and Smith. *International Journal of Mental Health and Addiction*. 2017;15(6):1203-8.

77. Orford J. The gambling establishment and the exercise of power: A commentary on Hancock and Smith. *International Journal of Mental Health and Addiction*. 2017;15(6):1193-6.

78. Young M, Markham F. Rehabilitating Reno: a Commentary on Hancock and Smith. *International Journal of Mental Health and Addiction*. 2017;15(6):1187-92.

79. Abbott M, Bellringer M, Garrett N. *New Zealand National Gambling Study: Wave 4 (2015) (Report number 6)*. Auckland, New Zealand: Auckland University of Technology, Gambling and Addictions Research Centre; 2018.

80. Currie SR, Hodgins DC, Wang J, El-Guebaly N, Wynne H, Chen S. Risk of harm among gamblers in the general population as a function of level of participation in gambling activities. *Addiction*. 2006;101(4):570-80.

81. Currie SR, Hodgins DC, Wang JL, el-Guebaly N, Wynne H, Miller NV. Replication of low-risk gambling limits using Canadian provincial gambling prevalence data. *Journal of Gambling Studies*. 2008;24(3):321-35.

82. Currie SR, Hodgins DC, Casey DM, el-Guebaly N, Smith GJ, Williams RJ, et al. Deriving low-risk gambling limits from longitudinal data collected in two independent Canadian studies. *Addiction*. 2017;112(11):2011-20.

83. el-Guebaly N, Casey DM, Currie SR, Hodgins DC, Schopflocher DP, Smith GJ, et al. The Leisure, Lifestyle, and Lifecycle Project (LLLP): A longitudinal study of gambling in Alberta. Final report. Calgary, AB: Alberta Gambling Research Institute; 2015. Available from: https://prism.ucalgary.ca/handle/1880/50377.

84. Williams RJ, Hann R, Schopflocher D, West B, McLaughlin P, White N, et al. Quinte Longitudinal Study of gambling and problem gambling: Report prepared for the Ontario Problem Gambling Research Centre Guelph, ON 2015. Available from: http://www.greo.ca/Modules/EvidenceCentre/files/Williams%20et%20al%20%282015%29Quinte_longitudinal_study_of_gambling_and_PG.pdf.

85. Abbott MW. Commentary on Currie et al. (2017): Low-risk gambling limits—a bridge too far? *Addiction*. 2017;112(11):2021-2.

86. Quilty LC, Murati DA, Bagby RM. Identifying indicators of harmful and problem gambling in a Canadian sample through receiver operating characteristic analysis. *Psychology of Addictive Behaviors*. 2014;28(1):229-37.

87. Abbott M, Bellringer M, Garrett N, Mundy-McPherson S. *New Zealand National Gambling Study: Wave 2 (2013) (Report number 4).* Auckland, New Zealand: Auckland University of Technology, Gambling and Addictions Research Centre; 2015.

2.2 GAMBLING EXPOSURE

Gambling exposure is defined as the extent to which populations or population sectors come into contact with gambling activities.[1] Exposure is strongly influenced by availability, that is, the type, number, distribution, and accessibility of gambling activities. Exposure and participation are closely intertwined. Without opportunities to gamble, people are unable to do so. Gambling participation is measured by involvement in specific gambling activities and includes assessments of frequency (how often), duration (for how long), and expenditure (how much money was spent). Participation can become problematic when the gambler and/or other people experience harm as a consequence of his or her participation.

Gambling types vary in their potency and ability to lead to harm. Some types of gambling (such as lotteries and raffles) are relatively benign. Other types (e.g., Electronic Gaming Machines (EGMs), casino table games, horse race betting, and sports betting) can more easily lead to harm, especially through regular, prolonged participation, because they are continuous in nature and involve an element of skill or perceived skill.[2-5] (Here, the term EGMs is being used interchangeably with slot machines.)

There are also indications that problems develop more rapidly in association with some types of gambling (for example EGMs) than others,[6] but that these problems may be more short-lived.[7] Therefore, it is important to think about exposure levels for different types of gambling and also engagement in multiple forms of gambling (see Binde, Romild, and Volberg[8]). It is also important to develop better ways to assess the risk potential and harm associated with different gambling types and closely analyze the settings within which they are provided.[9]

In this section, the following factors related to gambling exposure are discussed in greater detail: gambling setting, accessibility, adaptation, marketing and messaging, and the convergence of gaming and gambling. There is a large body of research on gambling participation and harmful gambling, their associations with the availability of particular gambling forms, and changes in participation and problems over time. These studies are predominantly from a single time point and do not establish the direction of relationships, or distinguish between a cause and its effect.

Further work is needed to develop more refined measures of gambling exposure and the contextual and environmental factors that influence gambling participation and problems. Until recently there has been a lack of high quality studies that assess participants over time (i.e., longitudinal studies). Such studies could assess the onset of at-risk and harmful gambling, and identify factors related to harmful gambling development, including recovery, remission, and relapse.

Studies of this type and natural experiments allow a better understanding of potential causes of harmful gambling. Recent meta-analyses and reviews have provided support for both the exposure and adaptation hypotheses (see below). However, research examining factors responsible for adaptation, including the possible impacts of policy and regulatory measures, is in its infancy. A number of longitudinal studies that began in the mid-2000s, and/or are currently underway, will improve evidence in this area (see Section 5 Longitudinal Cohort Studies).

The context of gambling is of great importance to gambling exposure and to social factors discussed in Section 3.2 Social Factors. Apart from jurisdictions, communities, and localities, there are additional, more local contexts within which gambling exposures can vary. These contexts include families and workplaces, as well as peer, cultural, and religious groups. Typically, most people report being introduced to gambling within their family of origin. Starting to gamble at an early age is a risk factor for harmful gambling. People who begin gambling in late adolescence or adulthood more often report being introduced to gambling by external socializing agents, including friends, advertising, colleagues, and partners/spouses.[10] Those introduced to gambling in their late teens and early adulthood had a very low prevalence of harmful gambling, raising the possibility that initial participation in adulthood may lead to greater long-term risk of harmful gambling.

In the past, increases in gambling have most often been explained by availability of money, availability of gambling options (especially in the case of people with gambling problems), and advertising.[11] One study found that adults who reported gambling before they were 13 years old were more likely to have current gambling problems. The same was true of people who reported starting to gamble at age 25 or older.[12]

In a 2006 study, Turner et al. found that there was no linear relationship between age of gambling onset and problem behaviour.[13] Most people without gambling problems began to gamble between the ages of 18 and 23, while people with gambling problems began to gamble either before 18 or after 23. In both studies, it is possible that the higher risk for later onset gamblers could have been due to the relatively recent introduction of EGMs and casinos.

Spouses or partners, and other family members, are most often mentioned as gambling companions, although this varies across venues, gambling forms, and population sectors.[11] Teens and adults who gamble often—particularly those with gambling problems—report much higher levels of gambling participation in both their current families and households, and in their family of origin.

Substantial variation in gambling participation is found across occupational and religious groups. Walker,[5] among others, has cited sociological studies dating back to the 1950s that suggest ways in which work and other reference groups can encourage and discourage gambling. For instance, people working in the gambling industry may be at more risk for harmful gambling. Shaffer and Hall found high rates of harmful gambling among casino employees, especially younger and more recent employees; however, longer-term employees had lower rates.[14] They interpreted this as indicating an elevated risk of gambling problems during early exposure, followed by adaptation as time went by.

2.2.1 GAMBLING SETTING

Gambling takes place in many different locations. Commercial forms of gambling (including casinos and gambling machines at social clubs and hotels) occur in locations where many people feel safe compared to venues where less legitimate forms of gambling occur. Some research suggests that women, older adults, and some migrant groups prefer to gamble in venues where they feel physically safe and comfortable.[15-17] These feelings of safety and comfort may lead some people to gamble more than they can afford.

Along with the number and distribution of particular gambling types and venues, a variety of other factors have an impact on gambling exposure, gambling participation, and harmful gambling.[1, 18] Venue entry requirements and the legality, nature, and perceived safety of gambling settings, can influence who will participate and what their gambling behaviour will be like. The purpose of the activity, association with other attractions, alcohol availability, venue layout, as well as light, colour, sound effects, and background odours have also been shown to influence the time and money spent gambling.[2, 19]

It appears likely that co-locating ATMs and credit facilities with certain gambling types contributes to at-risk and harmful gambling, and this likely extends to proximity and access to loan sharks as well.[20] Several gambling activities are only accessible in venues licensed to serve alcohol. Although this helps to restrict access by underage minors, there are indications that drinking alcohol while gambling reduces inhibition, and leads to more intensive and risky gambling behaviour.

A number of measures have been proposed or intentionally introduced in gambling settings to promote moderation in gambling behaviour and to reduce harmful gambling. Some measures include preventing intoxicated people from gambling: prohibiting credit or cash advances for gambling; training staff in responsible gambling practices; pre-commitment to specified loss and/or time limits; controls on advertising and promotions; not cashing cheques for large sums; self-exclusion programs; closing facilities for a least a few hours each day; and providing clocks and natural lighting in gambling areas. Research evaluating these and other prevention measures is not well-developed and it remains uncertain what effect they have on gambling participation, including at-risk and harmful gambling.[21-23]

Since 1995, gambling on the Internet has grown rapidly—a trend that is likely to continue as access on mobile devices, such as smart phones and tablets, takes different gambling activities directly into homes and workplaces throughout the world. While base rates are low, online gambling has increased significantly despite efforts of governments to control or manage access.[24, 25] Online gambling will continue to evolve with ongoing changes and competition among Internet gambling sites, with new demographic groups such as women and older adults entering the market, and with a growing number of jurisdictions legalizing and regulating these activities.

The nature of online gambling makes it an inherently more problematic way of gambling. Greater convenience, easier access, the solitary nature of play, the ability to play when intoxicated, the lack of realistic cash markers, the ability to play with credit, the lack of age verification, and the ability to play multiple sites and/or games simultaneously are all features that contribute to a lessening of players' ability to control their involvement. Another challenge is that people with gambling problems using the Internet have a much more difficult time avoiding gambling venues, which are available at the nearest Internet-enabled device.[26, 27] Recent empirical studies have tested the relationship between online gambling and gambling harms. Although online gambling

has been associated with gambling problems,[28] it is evident that online gamblers often engage in multiple forms of gambling, both online and offline, and that this *diversity* is a strong predictor of problematic gambling.[29-31] It is currently unclear whether online engagement *per se* adds to this risk, after controlling for engagement in multiple forms.[32] At the same time, online gambling allows players to limit the amount of money staked and the hours of play, although only on a given website. Gambling companies may also implement player tracking systems that warn players if their gambling behaviour appears to be risky. The Internet allows for more sophisticated responsible gambling measures than any other way of providing gambling.

2.2.2 ACCESSIBILITY

Historically, some societies had little or no exposure to gambling.[33] Others experienced long-term alternating cycles of liberalization and restriction, with the latter typically linked to rising official and public concern about gambling eroding morals and public order.[34, 35]

During the past two to three decades, gambling availability, participation, and expenditure have increased significantly around the world. This most recent expansion is unprecedented and is affected by interrelated forces that continue to drive the global evolution of commercial gambling.[36]

At the same time, there has been a rapid expansion of Internet gambling sites, which allow access from home, work, and portable devices. However, in several populations during the past decade, overall gambling participation has declined considerably despite further increases in availability. In some of these cases, expenditure has continued to rise, and in others to level out, or decline. These changes may be aspects of *adaptation*, which is discussed later in this section.

Accessibility of gambling activities is necessary for gambling participation and, in turn, participation is necessary for the development of harmful gambling. Greater availability of gambling and associated attitude changes towards gambling are widely believed to have led to both increased participation and an increase in gambling-related harms.

Orford has stated that although the reasons for harm are complex and multifactorial, "the more the product is supplied in an accessible form, the greater the consumption and the greater the incidence and prevalence of harm."[37, p1236] Major reviews of relevant literature and official inquiries have generally agreed on this point, with varying degrees of qualification. Research has found that Orford's argument may hold in the early phases of expansion of the gambling market, but potentially not during the past two decades in most jurisdictions.[38] Many aspects of accessibility or exposure have been identified, but only a few have been studied. Some work has been done to create measures of exposure, but these tend to be specific to single gambling activities or jurisdictions. Overall, the conceptualization and measurement of gambling exposure are not well developed.

Many surveys have examined differences in self-reported gambling participation among regions and population sectors. Others have assessed participation changes over time. Some have considered associations between availability of gambling and participation, including participation changes following the introduction of new gambling forms or a significant change in how gambling is provided.[2]

Regardless of the specific considerations, the findings from most studies are consistent with the view that increased availability of gambling opportunities is associated with an increase in the percentage of the population that participates. In several instances, the introduction and expansion of some forms of gambling and/or gambling settings has been followed by noticeable changes in the demographic mix of people who take part in gambling activities. As noted earlier though, in several jurisdictions, initial increases in participation have been followed by significant decreases, even when availability continued to increase.

Many studies using official data sources show strong relationships between gambling availability and per capita gambling expenditure. Casinos and EGMs have typically dominated markets within a few years after their introduction. Where EGMs are widely distributed outside casinos, strong co-variation is typically found between EGM numbers and EGM expenditure. Strong relationships have also been found between how many EGM venues are located in a specific area, and expenditure at local and regional levels.[39] However, there are instances where expenditure continued to rise for a number of years after machine numbers had been capped. In some cases, it may have been an outcome of machines being relocated to communities where financial returns could be maximized.[40]

It is important to note that there are many different types of gambling undertaken in diverse settings, appealing to different sorts of people, and perceived in various ways by participants and observers.[1] These differences, among others, influence whether or not people take part, and whether or not participation becomes frequent or problematic.

Relationships among gambling availability, participation, and problems are complex. The ultimate effects of gambling exposure may also be influenced by other individual and environmental factors, as well as the length of exposure.[2, 38, 41, 42]

Gambling exposure is also significantly influenced by political decision making. Most gambling activities have many legal and regulatory controls that determine their provision and accessibility. Access to gambling activities, as with other products, services or facilities, is determined by several factors. In addition to legal considerations, spatial distribution and a variety of economic, social, and cultural factors are involved.

Gambling offers unique incentives, such as the potential for financial gains, and also meets other psychological needs, such as that for significant lifestyle changes. In many jurisdictions, gambling is readily available and accessible, particularly in the form of Internet gambling. This increases the attractiveness of gambling participation. Further, gambling outlets are often located in socioeconomically disadvantaged areas where there are high unemployment rates,[43] and in venues that offer cheap food, beverages, and entertainment. In these areas, limited income can restrict a person's ability to travel to other parts of their community that may offer other leisure options. Therefore, these individuals tend to access gambling facilities close to their home.

The local geography plays a significant role in the availability of and accessibility to gambling. The types, number, and concentration of venues where gambling is located; opening hours; conditions of entry; availability of transportation; availability of affordable alternative recreational facilities; and the physical visibility/ prominence of venues, are contributing factors to the overall gambling opportunities within a defined

geographical region.[40] Destination gambling venues densely situated in a local geographical area and promoted to tourists attract large numbers of people who are motivated to gamble. Las Vegas, Macau, and Singapore are good examples of such destinations.

Given the mobility of the tourist gamblers, gambling-related harms may be less evident at the local level, once participants leave and return to their place of origin.

2.2.3 ADAPTATION

As mentioned, it is widely believed that increased gambling availability has led to a rise in gambling participation and higher rates of gambling-related harm including problem gambling. While there are strong indications that this was the case during the early years of gambling expansion, in many jurisdictions participation and problem gambling rates subsequently declined. The initial increase in participation and harm is consistent with the *availability* or *exposure hypothesis*. This hypothesis has parallels with the single distribution or total consumption model in the alcohol field. As originally proposed by Ledermann,[44] it maintains that an increase in average alcohol consumption is associated with an increase in the proportion of heavy and problematic drinkers. This model has been influential in the alcohol field and in some other areas of public health. It supports policies that seek to reduce overall availability and consumption as a means to reduce harm.

While acknowledging findings consistent with the availability hypothesis, Shaffer et al.[45] and Abbott, Williams, and Volberg[46] proposed that, over time, populations adapt to gambling exposure and people participate less and experience less harm, even when exposure continues to increase. Shaffer and colleagues[45] were of the view that this process would probably take decades or generations. Abbott and colleagues[46] believed it could occur more rapidly. The hypothesis was initially rejected by a number of gambling researchers. For example, in response to invited commentaries from Abbott,[47] Shaffer,[48] and others, Orford[37] replied:

> Complex and multifactorial though causation is, the more the product is supplied in accessible form, the greater the volume of consumption and the greater the incidence and harm. I doubt there would be many who would argue with that basic public health law when it comes to the supply of alcohol, tobacco, and other drugs of various kinds. It would be very surprising indeed if that rule was not also true for gambling, and the onus should be upon those who think gambling might be an exception to the general law to prove their case (p. 1236).

Proponents of *adaptation hypothesis* accept that the availability hypothesis applies in some circumstances but not universally. In other situations, relationships between availability, participation, and harm change and additional factors become more important. For example, Abbott[49] proposed:

1. During exposure to new forms of gambling, particularly EGMs and other continuous forms, previously unexposed individuals, population sectors, and societies are at high risk for the development of gambling problems.

2. Over time, years rather than decades, adaptation ('host' immunity and protective environmental changes) typically occurs and problem levels reduce, even in the face of increasing exposure.

3. Adaptation can be accelerated by regulatory and public health measures.

4. While strongly associated with problem development (albeit comparable to some other continuous forms when exposure is held constant) EGMs give rise to more transient problems.

Recent reviews have found additional support for the availability hypothesis.[50-53] They have also identified a number of studies with contradictory findings. Methodological variation is a major consideration when comparing the results of surveys across jurisdictions and within jurisdictions over time. Two studies made adjustments for methodological variation to varying degrees and evaluated both the availability and adaptation hypotheses.

Storer et al.[54] examined 34 Australian and New Zealand gambling surveys conducted since 1990. Their meta-analysis adjusted for the problem gambling measures used. They found that problem gambling prevalence increased with higher EGM density (EGMs per capita) and decreased over time when density was held constant. Over 20 years, the findings were consistent with both the availability and adaptation hypotheses. Of further significance, EGM density and time explained nearly three-quarters of the variance in problem gambling prevalence, strongly suggesting that both play major roles in determining problem gambling and very likely other gambling-related harms.

Williams et al.[38] reviewed problem gambling prevalence studies conducted worldwide since the late 1980s. They used weightings to adjust for common methodological variations. In all regions where there was a sufficient number of studies (USA, Canada, and Australia), problem gambling prevalence rates initially increased and subsequently decreased. These decreases began in the late 1990s in Canada and early 2000s in the United States and Australia. Unlike Storer and colleagues[54] this study did not examine gambling availability. However, in the jurisdictions included, gambling availability increased throughout the study period. Consequently, the findings are consistent with both the availability and adaptation hypotheses.

Calado and Griffiths'[52] more recent world-wide review of problem gambling prevalence surveys from 2000 to 2015 included a substantial number of European studies. Past year problem gambling prevalence estimates ranged from 0.1% to 5.8%, virtually the same as the range Williams et al.[38] reported. Generally, rates were higher in Asia, lower in Europe, and intermediate in Australasia. They noted that in jurisdictions where more than one survey had been undertaken, problem gambling rates typically remained stable. The most notable exception was Estonia where prevalence of problem gambling increased. They suggested that this may have been a consequence of recent exposure to a range of previously prohibited gambling activities. Adjustments were not made for methodological variation, and prevalence rates were not examined in relation to gambling availability. Generally, however, throughout the study period availability continued to increase. While some caution is required in interpreting the findings, they appear to be more in keeping with adaptation than with the availability hypothesis.

The *availability hypothesis* predicts that increased gambling availability leads to increased participation and harm. The *adaptation hypothesis* predicts a plateauing and reduction in problem gambling and harm rates in populations that have been exposed to gambling for

moderately long periods of time. It does not explicitly mention the role that gambling participation plays in this. However, Abbott and Volberg[12] proposed that increased awareness of the risk and harm associated with some types of gambling and participation patterns will lead to changes in attitudes towards gambling and reduced gambling participation. They believed that reduced participation, especially in EGMs and other continuous forms, would be a factor in the reduction of problem gambling prevalence rates. In this regard, the availability and adaptation models are the same. Both predict reductions in harm when participation declines. The foregoing reviews did not examine gambling participation rates in relation to problem gambling prevalence. It would have been difficult to do this because there is considerable variation in the way participation is measured, even more so than is the case with problem gambling. However, a number of studies have compared changes in both participation and problem gambling over time in the same jurisdiction. In some case studies they used similar methodologies, including the same or very similar measures of participation and problem gambling.[50, 55-57]

During the past decade or more it appears that gambling participation has decreased markedly in a number of jurisdictions, despite gambling availability continuing to increase both online and offline. Several studies have found substantial reductions across most or all demographic groups and many gambling activities.[50, 55] Contrary to the availability, total consumption, and adaptation hypotheses, these participation reductions have not been accompanied by reduced problem gambling prevalence. Reduced participation is most apparent for young adults, yet in some studies problem gambling prevalence increased in this population sector.[56, 57] Recent prospective studies indicate that a substantial proportion of people who develop a gambling problem are past problem gamblers who are relapsing (see Abbott, Romild and Volberg;[58] Abbott et al.;[59] Billi et al.;[60] and, Luce, Nadeau, and Kairouz[61]). It has been suggested that this, in part, explains plateaued prevalence rates in jurisdictions with declining participation rates. Prospective studies have identified a number of factors additional to gambling exposure and participation that contribute to problem gambling onset, duration, and relapse. As mentioned, they include ethnicity, high levels of deprivation, low income, feelings of marginalisation, experience of multiple major life events, high psychological distress, and substance use/misuse. Their persistence or increase very probably provides a further explanation for plateaued problem gambling prevalence rates. It is likely that the concentration of more 'toxic' forms of gambling in high deprivation neighbourhoods contributed further.

Research is required to increase understanding of the complex and changing relationships between gambling exposure, participation and harm. With respect to prevention and harm reduction, reducing gambling exposure is likely to remain important, especially in the case of more vulnerable and at-risk groups. However, it is likely that significant gambling-related harm reduction will require increased attention to policies and programs that address other risk and protective factors that could be modified, including those that are common to a number of other addiction and mental health disorders (see Section 3.3.6 Comorbid Disorders).

2.2.4 MARKETING AND MESSAGING

As already discussed, views on gambling are generally positive in some societies, and these positive views make their way into the mass media; for example, in the form of coverage of gambling news, stories about jackpot winners, and advice on how to bet and gamble. Gambling also becomes a common topic in popular culture, such as movies, television series, novels, and urban legends about remarkable stories of good or bad luck that gamblers have supposedly experienced.

Such representations portray gambling in a positive light, and through explicit or implicit symbolic and mythological messages, they root gambling in culture and society.[62-64] Gambling games, which in and of themselves may be rather trivial, are imbued with positive qualities such as having fun, excitement, and companionship. By doing so, gambling may acquire moral, social, and spiritual dimensions. This can make gambling seem like a more interesting and worthwhile activity to pursue.

The marketing messages of commercial gambling and the design of gambling equipment (e.g., EGMs and lottery tickets) may have a similar influence, as they often use images and symbols to convey a message that gambling is fun, exciting, and can make people rich.[65-67] Some gambling games may be represented as having qualities that make them especially attractive for specific sociocultural groups (e.g., luxurious casinos for the rich, and unpretentious bingo parlours for low income earners). The design of gambling venues, in particular casinos, may contain symbolic and psychological cues intended to increase gambling involvement by influencing the mood and behaviour of patrons.[68] Promotions for sports betting typically associate betting with male camaraderie, skill, competition, and love for the sport and/or a team.[69]

The long-term impact of gambling advertising on attitudes towards gambling is difficult to assess. Some argue that advertising in general has a substantial impact on consumer preferences and attitudes towards the products promoted. Others argue, however, that advertising merely takes advantage of emerging trends in popular culture and changes in values, and that it mostly affects the market shares of various products.

At the individual level there is research evidence that gambling advertising influences how gambling is perceived (e.g., Derevensky et al.;[70] Hanss et al.[71]). Some scholars consider this influence on the individual level to be evidence of advertising contributing to the normalization of gambling in society (e.g., Lopez-Gonzalez, Guerrero-Solé, and Griffiths[72]). It seems reasonable to assume that such normalization occurred in the early phase of expansion of gambling opportunities. However, there are no longitudinal studies examining the relationship between the extent of gambling promotion and attitudes towards gambling, and thus no empirical evidence for normalization in the current and late phases.

Today, there are examples of jurisdictions (such as Sweden), where public attitudes towards gambling have become much more critical, and the number of people who gamble occasionally and regularly has declined (although those who do gamble spend more than before), despite huge increases in the volume of gambling advertising. This suggests *advertising fatigue* among consumers, as well as a growing perception that gambling has become excessive. Gambling advertising in the mass media is often one of the most disliked forms of advertising. Although it certainly encourages some people to gamble and view gambling more favourably, massive advertising may cause an even larger number of people to view gambling in an increasingly negative light.

In general, advertising and other forms of promotion are very important for gambling companies in a competitive market. Advertising helps them to attract new customers and inspire more gambling among existing ones. This is especially important

for online gambling companies. Having no physical venues, these companies need to make themselves visible to potential customers and keep in close touch with existing ones, so as not to lose customers to other companies and to maintain their gambling involvement through incentives and various offers.

The prime objective of gambling marketing is to increase or maintain the sales of one's *own* company. There is usually a strong emphasis on the Unique Selling Point/ Proposition (USP) of a company or particular gambling offer that differentiates it from other companies. No company promotes gambling for its own sake, which could potentially benefit any company in the market. Therefore, much of gambling advertising has an impact primarily on the market shares of specific companies – i.e., a gambler is motivated to choose one company or offer rather than another. However, total consumption of gambling also increases because with more USPs, there is a greater appeal to more people, especially in a growing market, and every advertising message is intended as an incitement to gamble. The extent to which total consumption might be stimulated is difficult to measure, while the effectiveness of specific advertising campaigns is relatively easy to judge from their impact on sales.

Assessing the impact of gambling advertising on the extent of harmful gambling is difficult—more so than its impact on attitudes and on consumption. There is no empirical research on the extent of the advertising impact at a population level (with the exception of one cross-sectional panel study with numerous methodological limitations: Planzer, Gray, and Shaffer[73]). On the basis of the available knowledge about how advertising works and the prevalence of harmful gambling, the effect of gambling advertising is generally considered small compared to other factors that contribute to harmful gambling.[74, 75] However, in certain circumstances, such as when a risky form of gambling is introduced into an immature market and heavily promoted, advertising is likely to contribute more prominently to harmful gambling.

Although it may be impossible to estimate exactly how much advertising contributes to the prevalence of problem gambling, it is possible to study the relative impact of different kinds of advertising on various groups of people.[76] For example, studies have shown that the repeated cues to gamble from gambling advertising are especially problematic for people who already have a gambling problem or are recovering from one (e.g., Binde,[77] Binde and Romild,[78] Grant and Kim,[79] and Hing et al.[80]).

Youth who scored high on a "vulnerability index" reported that they sometimes or often gambled after having seen an advertisement, more so than those who scored low.[70] Perceptions of gambling advertising vary across ethnic groups, and people with gambling problems report that some advertising messages influence them more than others.[78, 81-83] Results from these studies are valuable in identifying forms of advertising and messages that may be especially likely to contribute to harmful gambling, and therefore should only be used by gambling providers with caution or not at all.

Traditional forms of advertising are increasingly being replaced or complemented by sponsorship[84, 85] and new promotional approaches, such as marketing in social media on the Internet, viral marketing, and consumer-generated advertising.[86] Research on gambling advertising and promotion has grown in the past years,[76, 87] but there are still areas that are just beginning to be chartered, such as the impact of promotion via SMS and in-app notifications to customers of gambling companies.[88]

2.2.5 CONVERGENCE OF GAMING AND GAMBLING

Traditional gambling and gaming activities have migrated to the internet and digital media. In this context they have grown rapidly, and digital gaming and gambling have converged in various ways. Gambling activities increasingly include gaming themes, and online games often include gambling and gambling-like elements. This convergence is accelerating.

Gaming is differentiated from gambling in that outcomes, which may include prizes of value, are entirely or primarily achieved by skill. While this differentiation is commonly made, gaming is also used as a synonym for gambling, particularly by gambling industry groups.[50] This practice may stem from an interest in avoiding negative connotations associated with gambling. Convergence is adding to this linguistic confusion and challenging legislators and regulators.

A number of games enable participants to place bets on their outcomes and receive monetary payments. Mini-games featuring gambling activities such as casino games and *wagering* on sporting events feature increasingly in video games. Loot boxes have also become commonplace in digital games, where participants pay money to access items within games. These items vary in value and item receipt is driven by chance. Loot boxes have been classified as gambling in some jurisdictions, but not in others. This is an important issue, among other things determining whether or not age and other restrictions are applied. (More information is provided in the Gambling-like gaming sub-section that follows.)

Furthermore, there are sites where virtual items can be traded for money. The incorporation of gambling and gambling-like elements within games is intended to make them profitable and more exciting to participants.[89] It may also contribute to players transitioning to online and land-based gambling activities.

Convergence is also strongly evident in online social casino games[90] and sports events/activities. Online and in-venue betting on sports events have rapidly extended to include virtual and eSports, immersive reality, and fantasy sports.[91] There has also been rapid growth in betting on the outcomes of video games and tournaments. Not only is the content between gaming and gambling converging, but the media that they are based on is converging as well. While gaming used to be confined to computers and video game consoles, people are now able to gamble on their computer, and even in virtual reality.[92] There are numerous and increasing crossovers in gambling and gaming networks, platforms, and products. Among other things, this convergence allows gambling operators to reach a much larger market.[93] Participation in games with gambling themes may also help sustain brand loyalty when participants are not gambling.

King et al.[94] and Gainsbury et al.[89] provide comprehensive reviews of the gaming-gambling convergence and a framework to classify gambling, gaming, and gambling-like game hybrids. Key elements include interactivity, monetization, betting/wagering mechanics, role of skill versus luck in determining outcomes, the nature of outcomes, structural fidelity, context, centrality, and advertising.

Gambling-type games not for money have long been featured on gambling and other internet sites and are increasingly present on social networking sites. Many online gambling operators provide free-play versions of online gambling. They are also frequently offered on different sites from their gambling products. This allows them to advertise with fewer age and other restrictions. Gambling-type games not for money appear to be more popular than online gambling for money. The New Zealand National Gambling Survey (NGS) re-assessed a nationally representative sample annually from 2012 to 2015.[55] Between 13-17% of adults participated in one or

more of these games during the past 12 months. This included fantasy football (3-5%), internet poker (2-4%), online casino games (2%), and internet bingo (1%). During this period only 1-2% took part in gambling activities of this type online. Somewhat more, 8-10%, accessed lottery products or wagered on track or sports events online.

Some studies report that youth and adults who take part in games with gambling themes, including social casino games, more often engage in gambling activities and experience gambling-related problems.[86, 90, 95-97] Given the cross-sectional nature of this research it is unclear what these associations mean. There appear to be only two relevant long-term studies. Dussault et al.[98] tracked adolescents who had not previously gambled for money. They found that simulated poker participation predicted playing poker for money 12 months later. The NGS found that participation in gambling-type games not for money predicted future onset of at-risk and problem gambling – even when gambling participation and other factors commonly found to be associated with problem gambling were included in the analysis.[55] These results suggest that participation in this type of activity may make an independent contribution to the development of at-risk and problem gambling.

Gaming-like Gambling: In addition to the inclusion of gambling elements within gaming, there has also been increased incorporation of gaming elements and themes within gambling. For example, some EGMs now incorporate an element of skill and others include features that increase the impression that skill is involved. While yet to be assessed, this could increase their already high addictive properties. EGMs also increasingly include themes from social video games and television game shows. These developments may help attract and retain younger participants.[89]

Gambling-like Gaming: Video games are increasingly displaying elements and phenomena we would traditionally associate with gambling. As such, some people are concerned that there may be links between video games and harmful gambling. With this in mind, two developments stand out: the presence of gambling "mini-games" within video games (a game within a game), and the rapid rise and acceptance of "loot boxes" as a form of game monetization.

In the past several decades a growing number of video games have included *mini-games* within them that mirror gambling systems, contexts, or forms of play. For example, a game set in the Wild West might include a poker game (not for real money) with other digital characters in saloons; a game set in a large city might include buildings that contain slot machines (again, purely for in-game currency); others might contain the ability to wager virtual money on digital races, or sporting events, or the like. In each case, the gambling game is not the core of the gameplay, but rather a side attraction, a mini-game that players can choose to engage in or not. It is rare for such mini-games to be essential to progression, although in many cases they can help the player advance if tackled correctly. As such, many of the surrounding elements of gambling – its aesthetics, spaces and contexts of play, and often mechanics – are reproduced in digital games without real-world financial consequences. Although no data currently exists on this, it seems reasonable to assume that many non-gamblers can claim a familiarity with gambling activities that would be surprisingly detailed, given a lack of direct (wagering) engagement in such play. This is not to suggest any kind of slippery slope argument about supposed risks of including such fictional elements in digital play—we can usefully contrast this with the moral panic over video game violence, now entirely debunked[99, 100]—but it is one element of the increasing convergence of digital games and certain aspects of gambling.

In the second and more striking case, the last five or so years has seen the emergence of *loot boxes* in digital games. These are virtual containers that house a number of items whose properties are unknown at the moment of purchase. In this regard, they are comparable to buying a pack of baseball cards or trading cards, except that the precise odds of each item can be set at the moment of purchase (in a digital storefront), rather than at the point of manufacture (in a real-world factory). Given that these entail the purchase of something for "real-world" money with an unknown outcome that might, or might not, seem to *justify* the initial investment, loot boxes have been popularly branded as a "gambling" system that has found its way into video games. In general, response from policymakers has been hostile: some nations have banned or partly banned loot boxes,[51, 101] while others are currently conducting extensive enquiries into the topic. Gamer response has been more mixed;[102, 103] some players and game critics seem to be comfortable with these purchases, given the significant profits in this area that many games companies report, while others have been highly critical of loot boxes' emergence. Loot boxes are certainly the focus of gambling in video games at the present point, with researchers now beginning to ask a number of central questions. Which game developers use them and why? How are they implemented? How do players respond? Loot boxes are fundamentally interwoven with many additional complex elements, including the political economy of the video game industry and video game culture more broadly,[104, 105] which will be crucial for understanding any potential harms in a gaming context that loot boxes might bring.

Overall, however, there is presently no data on whether or not either of these phenomena contributes to harmful gambling. Nevertheless, the expansion of gambling aesthetics through mini-games, and the expansion of gambling mechanics through loot boxes, should not be overlooked: in all aspects except the actual wagering of real-world money, and in loot boxes through spending real-world money, video games have become increasingly conversant with gambling in recent years.[106] To summarize, these are the main ways in which this has occurred:

- Video games have adopted many of the structural elements of gambling and monetized these elements (loot boxes);
- Open source monetized video game content (skins) has enabled unregulated gambling;
- Gambling markets on competitive gaming events (Esports) have emerged and become integrated among other gambling offerings;
- Gambling brands and products are promoted on the same channels used to promote gaming; and,
- Online gaming social influencers (e.g., Twitch gaming entertainers) may promote monetized gaming activities (e.g., skin gambling).

Given the ease with which video games become a subject of public outcry,[107-109] such phenomena should be approached cautiously and with an open mind; with the apparent dangers of video game violence debunked,[99, 100] for example, we should not assume the worst over video game gambling. And yet with tens or hundreds of millions of players playing games with loot boxes, and large numbers enjoying gambling mini-games without a second thought, the appearance of gambling within video games marks a significant new trend for both gambling studies and game studies to fully examine both as an emerging phenomenon and in the context of the possibility of harmful gambling.

REFERENCES

1. Abbott MW. Situational factors that affect gambling behavior. In: Smith G, Hodgins D, Williams R, editors. *Research and measurement issues in gambling studies*. First ed. San Diego, CA: Academic Press; 2007. p. 251-78.

2. Abbott M, Volberg R, Bellringer M, Reith G. A review of research on aspects of problem gambling. London, UK: Responsibility in Gambling Trust; 2004.

3. Binde P. What are the most harmful forms of gambling? Analyzing problem gambling prevalence surveys - CEFOS Working Paper 12. Gothenburg, Sweden: Center for Public Sector Research, University of Gothenburg; 2011.

4. Raylu N, Oei TPS. Pathological gambling. *Clinical Psychology Review*. 2002;22(7):1009-61.

5. Walker M. *The psychology of gambling*. Oxford, UK: Pergamon Press; 1992.

6. Evans RI. Some theoretical models and constructs generic to substance abuse prevention programs for adolescents: Possible relevance and limitations for problem gambling. *Journal of Gambling Studies*. 2003;19(3):287-302.

7. Abbott MW, Williams MM, Volberg RA. A prospective study of problem and regular nonproblem gamblers living in the community. *Substance Use and Misuse*. 2004;39(6):855-84.

8. Binde P, Romild U, Volberg RA. Forms of gambling, gambling involvement and problem gambling: Evidence from a Swedish population survey. *International Gambling Studies*. 2017;17(3):490-507.

9. Peren FW. Assessment tool to measure and evaluate the risk potential of gambling products: AsTERiG. *Gaming Law Review and Economics*. 2011;15(11):671-9.

10. Abbott MW. What do we know about gambling and problem gambling in New Zealand? Wellington, New Zealand: Department of Internal Affairs; 2001.Report No.: 0478092679 Available from: https://www.dia.govt.nz/pubforms.nsf/URL/Report7.pdf/$file/Report7.pdf.

11. Abbott MW. Problem and non-problem gamblers in New Zealand: A report on phase two of the 1999 national prevalence survey. Wellington, New Zealand: Department of Internal Affairs; 2001.Report No.: 0478092474.

12. Abbott MW, Volberg RA. *Taking the pulse on gambling and problem gambling in New Zealand: A report on phase one of the 1999 national prevalence survey*. Auckland, New Zealand: Department of Internal Affairs Wellington; 2000.

13. Turner NE, Zangeneh M, Littman-Sharp N. The experience of gambling and its role in problem gambling. *International Gambling Studies*. 2006;6(2):237-66.

14. Shaffer HJ, Hall MN. The natural history of gambling and drinking problems among casino employees. *The Journal of Social Psychology*. 2002;142(4):405-24.

15. Hilbrecht M, Mock SE. Low-risk, moderate-risk, and recreational gambling among older adults: Self-complexity as a buffer for quality of life. *Applied Research in Quality of Life*. 2018.

16. Liu Z. Wheels and tiles: Maintaining social connections through mah-jong and roulette gambling in Manchester. London, UK: Goldsmiths College; 2015. Available from: http://rgtinfohub.org.uk/wp-content/uploads/2015/12/Wheels-and-Tiles-01072013.pdf.

17. Raylu N, Oei TP. Role of culture in gambling and problem gambling. *Clinical Psychology Review*. 2004;23(8):1087-114.

18. Thomas AC, Bates G, Moore S, Kyrios M, Meredyth D, Jessop G. Gambling and the multidimensionality of accessibility: More than just proximity to venues. *International Journal of Mental Health and Addiction*. 2011;9(1):88-101.

19. Finlay K, Marmurek HHC, Kanetkar V, Londerville J. Casino decor effects on gambling emotions and intentions. *Environment and Behavior*. 2010;42(4):524-45.

20. Thomas A, Pfeifer J, Moore S, Meyer D, Yap L, Armstrong A. Evaluation of the removal of ATMs from gaming venues in Victoria, Australia. Melbourne, Australia: Department of Justice Victoria; 2013. Available from: https://www.researchgate.net/publication/261216424_Evaluation_of_the_removal_of_ATMs_from_gaming_venues_in_Victoria_Australia.

21. Ladouceur R, Blaszczynski A, Lalande DR. Pre-commitment in gambling: A review of the empirical evidence. *International Gambling Studies*. 2012;12(2):215-30.

22. Parke J, Parke A, Blaszcynski A. Key issues in product-based harm minimisation: Examining theory, evidence and policy issues relevant in Great Britain. London, UK: Responsible Gambling Trust; 2016.

23. Williams RJ, West BL, Simpson RI. Prevention of problem and pathological gambling: A comprehensive review of the evidence. Guelph, ON: Gambling Research Exchange Ontario; 2008. Available from: https://www.uleth.ca/dspace/bitstream/handle/10133/414/2008-Prevention-OPGRC.pdf?sequence=7.

24. Williams RJ, Wood RT, Parke J. Policy options for internet gambling. In: Wood RT, Parke J, editors. *Routledge international handbook of internet gambling*. London, UK: Routledge; 2012. p. 349.

25. Wood RT, Williams RJ. Internet gambling: Prevalence, patterns, problems, and policy options. Guelph, ON: Ontario Problem Gambling Research Centre; 2009. Available from: http://www.greo.ca/Modules/EvidenceCentre/Details/internet-gambling-prevalence-patterns-problems-and-policy-options.

26. Schull ND. Digital Gambling: The coincidence of desire and design. *The ANNALS of the American Academy of Political and Social Science*. 2005;597(1):65-81.

27. T Wood R, J Williams R, K Lawton P. Why do Internet gamblers prefer online versus land-based venues? Some preliminary findings and implications. Journal of Gambling Issues [Internet]. 2007; (20)235-52 pp.]. Available from: http://hdl.handle.net/10133/375.

28. Griffiths M, Wardle H, Orford J, Sproston K, Erens B. Internet gambling, health, smoking and alcohol use: Findings from the 2007 British Gambling Prevalence Survey. *International Journal of Mental Health and Addiction*. 2011;9(1):1-11.

29. Gainsbury SM, Russell A, Blaszczynski A, Hing N. The interaction between gambling activities and modes of access: A comparison of Internet-only, land-based only, and mixed-mode gamblers. *Addictive Behaviors*. 2015;41:34-40.

30. LaPlante DA, Nelson SE, Gray HM. Breadth and depth involvement: Understanding Internet gambling involvement and its relationship to gambling problems. *Psychology of Addictive Behaviors*. 2014;28(2):396-403.

31. Philander KS, MacKay T-L. Online gambling participation and problem gambling severity: Is there a causal relationship? *International Gambling Studies*. 2014;14(2):214-27.

32. Gainsbury SM. Online gambling addiction: The relationship between internet gambling and disordered gambling. *Current Addiction Reports*. 2015;2(2):185-93.

33. Binde P. Gambling across cultures: Mapping worldwide occurrence and learning from ethnographic comparison. *International Gambling Studies*. 2005;5(1):1-27.

34. Miers DR. *Regulating commercial gambling: Past, present and future*. Oxford, UK: Oxford University Press; 2004.

35. Rose IN. Gambling and the law: The new millennium. In: Reith G, editor. *Gambling: Who wins? Who loses?* Amherst, NY: Prometheus; 2003. p. 113-31.

36. Abbott MW, Volberg RA. Gambling and problem gambling in the community: An international overview and critique. Wellington, New Zealand: Department of Internal Affairs Wellington; 1999.Report No.: 0478092482.

37. Orford J. Complicity on the river bank: The search for the truth about problem gambling: Reply to the commentaries. *Addiction*. 2005;100(9):1235-9.

38. Williams RJ, Volberg R, Stevens RMG. The population prevalence of problem gambling: methodological influences, standardized rates, jurisdictional differences, and worldwide trends. Guelph, ON: Gambling Research Exchange Ontario; 2012. Available from: http://www.greo.ca/Modules/EvidenceCentre/Details/population-prevalence-problem-gambling-methodological-influences-standardized-rates-0.

39. Marshall D. The gambling environment and gambler behaviour: evidence from Richmond-Tweed, Australia. *International Gambling Studies*. 2005;5(1):63-83.

40. Productivity Commission. Australia's gambling industries. Canberra, Australia: Australian Government Productivity Commission; 1999.Report No.: 10 Available from: https://www.pc.gov.au/inquiries/completed/gambling/report/summary.pdf.

41. Abbott MW, Volberg RA. Gambling and problem gambling in the community: An international overview and critique. Wellington, NZ: Department of Internal Affairs; 1999.Report No.: 1 Available from: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.119.9832andrep=rep1andtype=pdf.

42. Shaffer HJ, LaBrie RA, LaPlante D. 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*. 2004;18(1):40-8.

43. Xoridas S, Jasny J, Becker T. An ecological approach to electronic gambling machines and socioeconomic deprivation in Germany. Journal of Gambling Issues [Internet]. 2016; (33)21 p.]. Available from: https://jgi.camh.net/index.php/jgi/article/view/3948/4099. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/more-egms-are-found-in-german-communities-with-higher-unemployment-rates

44. Ledermann S. *Alcool, Alcoolisme, Alcoolisation, Vol. 1*. Paris, FR: Presses Universitaires de France; 1956.

45. Shaffer HJ, Hall MN, Vander Bilt J. Estimating the prevalence of disordered gambling behavior in the United States and Canada: A research synthesis. *American journal of public health*. 1999;89(9):1369-76.

46. Abbott M, Williams M, Volberg R. Seven years on: A follow-up study of frequent and problem gamblers living in the community, Report number two of the New Zealand Gaming Survey. Wellington, New Zealand: Department of Internal Affairs,; 1999, December. Available from: https://www.dia.govt.nz/Pubforms.nsf/URL/report2.pdf/$file/report2.pdf.

47. Abbott M. Disabling the public interest: Gambling strategies and policies for Britain: A comment on Orford 2005. *Addiction*. 2005;100(9):1233-5.

48. Shaffer HJ. From disabling to enabling the public interest: Natural transitions from gambling exposure to adaptation and self-regulation. *Addiction*. 2005;100(9):1227-30.

49. Abbott M. Do EGMs and problem gambling go together like a horse and carriage? *Gambling Research: Journal of the National Association for Gambling Studies (Australia)*. 2006;18(1):7.

50. Abbott MW. Beyond Reno: A critical commentary on Hancock and Smith. *International Journal of Mental Health and Addiction*. 2017;15(6):1177-86.

51. Arif S. The Netherlands starts enforcing its loot box ban. IGN [Internet]. 2018. Available from: http://www.ign.com/articles/2018/06/20/the-netherlands-starts-enforcing-its-loot-box-ban.

52. Calado F, Griffiths MD. Problem gambling worldwide: An update and systematic review of empirical research (2000-2015). *Journal of Behavioral Addictions*. 2016;5(4):592-613.

53. Vasiliadis SD, Jackson AC, Christensen D, Francis K. Physical accessibility of gaming opportunity and its relationship to gaming involvement and problem gambling: A systematic review. Journal of Gambling Issues [Internet]. 2013; (28). Available from: https://doi.org/10.4309/jgi.2013.28.2.

54. Storer J, Abbott M, Stubbs J. 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*. 2009;9(3):225-44.

55. Abbott M, Bellringer M, Garrett N. *New Zealand National Gambling Study: Wave 4 (2015) (Report number 6)*. Auckland, New Zealand: Auckland University of Technology, Gambling and Addictions Research Centre; 2018.

56. Abbott M, Stone CA, Billi R, Yeung K. Gambling and problem gambling in Victoria, Australia: Changes over 5 years. *Journal of Gambling Studies*. 2016;32(1):47-78.

57. Abbott MW, Romild U, Volberg RA. Gambling and problem gambling in Sweden: Changes between 1998 and 2009. *Journal of Gambling Studies*. 2014;30(4):985-99.

58. Abbott M, Romild U, Volberg R. The prevalence, incidence, and gender and age-specific incidence of problem gambling: results of the Swedish longitudinal gambling study (Swelogs). *Addiction*. 2017;113(4):699-707.

59. Abbott M, Bellringer M, Garrett N, Mundy-McPherson S. *New Zealand National Gambling Study: Wave 2 (2013) (Report number 4)*. Auckland, New Zealand: Auckland University of Technology, Gambling and Addictions Research Centre; 2015.

60. Billi R, Stone CA, Marden P, Yeung K. The Victorian Gambling Study: A longitudinal study of gambling and health in Victoria, 2008-2012. Victoria, Australia: Victorian Responsible Gambling Foundation; 2014. Available from: https://responsiblegambling.vic.gov.au/resources/publications/the-victorian-gambling-study-a-longitudinal-study-of-gambling-and-health-in-victoria-20082012-77/.

61. Luce C, Nadeau L, Kairouz S. Pathways and transitions of gamblers over two years. *International Gambling Studies*. 2016;16(3):357-72. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/gambling-patterns-of-moderate-risk-gamblers-vary-over-time

62. Binde P. Gambling and religion: Histories of concord and conflict. *Journal of Gambling Issues*. 2007(20):145-65.

63. Binde P. Why people gamble: A model with five motivational dimensions. *International Gambling Studies*. 2012;13(1):81-97.

64. Currie BB. *The gambler: Romancing lady luck. A Jungian exploration*. Toronto, ON: Inner City Books; 2007.

65. McMullan JL, Miller D. Wins, winning and winners: The commercial advertising of lottery gambling. *Journal of Gambling Studies*. 2009;25(3):273-95.

66. Nicki RM, Gallagher TM, Cormier AE. Attractiveness of video lottery terminal (VLT) games for problem and non-problem gamblers. *Gambling Research: Journal of the National Association for Gambling Studies (Australia)*. 2007;19(1/2):21.

67. Sklar A, Derevensky JL. Way to play: Analyzing gambling ads for their appeal to underage youth. *Canadian Journal of Communication*. 2010;35(4):533-54.

68. Kranes D. Play grounds. *Journal of Gambling Studies*. 1995;11(1):91-102.

69. Lopez-Gonzalez H, Guerrero-Sole F, Estevez A, Griffiths M. Betting is loving and bettors are predators: A conceptual metaphor approach to online sports betting advertising. *Journal of Gambling Studies*. 2018;34(3):709-26.

70. Derevensky J, Sklar A, Gupta R, Messerlian C. An empirical study examining the impact of gambling advertisements on adolescent gambling attitudes and behaviors. *International Journal of Mental Health and Addiction*. 2010;8(1):21-34.

71. Hanss D, Mentzoni RA, Griffiths MD, Pallesen S. The impact of gambling advertising: Problem gamblers report stronger impact on involvement, knowledge, and awareness than recreational gamblers. *Psychology of Addictive Behaviors*. 2015;29:483-91.

72. Lopez-Gonzalez H, Guerrero-Solé F, Griffiths MD. A content analysis of how 'normal' sports betting behaviour is represented in gambling advertising. *Addiction Research and Theory*. 2017;26(3):238-47.

73. Planzer S, Gray HM, Shaffer HJ. Associations between national gambling policies and disordered gambling prevalence rates within Europe. *International Journal of Law and Psychiatry*. 2014;37(2):217-29.

74. Binde P. The good, the bad and the unhappy: The cultural meanings of newspaper reporting on jackpot winners. *International Gambling Studies*. 2007;7(2):213-32.

75. Planzer S, Wardle H. *The comparative effectiveness of regulatory approaches and the impact of advertising on propensity for problem gambling*. London, UK: Responsible Gambling Fund; 2011.

76. Binde P. Gambling advertising: A critical research review. London, UK: The Responsible Gambling Trust; 2014. Available from: https://about.gambleaware.org/media/1165/binde_rgt_report_gambling_advertising_2014_final_color_115p.pdf.

77. Binde P. Exploring the impact of gambling advertising: An interview study of problem gamblers. *International Journal of Mental Health and Addiction*. 2009;7(4):541-54.

78. Binde P, Romild U. Self-reported negative influence of gambling advertising in a Swedish population-based sample. *Journal of Gambling Studies*. 2018.

79. Grant JE, Kim SW. Demographic and clinical features of 131 adult pathological gamblers. *The Journal of Clinical Psychiatry*. 2001;62(12):957-62.

80. Hing N, Cherney L, Blaszczynski A, Gainsbury SM, Lubman DI. Do advertising and promotions for online gambling increase gambling consumption? An exploratory study. *International Gambling Studies*. 2014;14(3):394-409.

81. Clarke D, Tse S, Abbott M, Townsend S, Kingi P. Key indicators of the transition from social to problem gambling. *International Journal of Mental Health and Addiction*. 2006;4(3):247-64.

82. Clarke D, Tse S, Abbott MW, Townsend S, Kingi P, Manaia W. Reasons for starting and continuing gambling in a mixed ethnic community sample of pathological and non-problem gamblers. *International Gambling Studies*. 2007;7(3):299-313.

83. Schottler Consulting. The marketing, advertising and sponsorship of gambling products and services within New Zealand. Auckland, New Zealand: New Zealand Ministry of Health; 2012.

84. Hing N, Lamont M, Vitartas P, Fink E. Sports-embedded gambling promotions: A study of exposure, sports betting intention and problem gambling amongst adults. *International Journal of Mental Health and Addiction*. 2014;13(1):115-35.

85. Milner L, Hing N, Vitartas P, Lamont M. Embedded gambling promotion in Australian football broadcasts: An exploratory study. *Communication, Politics and Culture*. 2013;46(2):177-98.

86. Gainsbury SM, Delfabbro P, King DL, Hing N. An exploratory study of gambling operators' use of social media and the latent messages conveyed. *Journal of Gambling Studies*. 2016;32(1):125-41.

87. Binde P. A bibliography of empirical studies on gambling advertising. Gothenburg, Sweden: OnGambling.org; 2017. Available from: https://ongambling.org/bibliography-gambling-advertising.pdf.

88. Hing N, Russell A, Rockloff M, Browne M, Langham E, Li E, et al. Effects of wagering marketing on vulnerable adults. Melbourne, AU: Victorian Responsible Gambling Foundation; 2018. Available from: https://responsiblegambling.vic.gov.au/documents/408/Effects-of-wagering-marketing-on-vulnerable-adults.pdf.

89. Gainsbury SM, King DL, Abarbanel B, Delfabbro P, Hing N. Convergence of gambling and gaming in digital media. Melbourne, Australia: Victorian Responsible Gambling Foundation; 2015. Available from: https://www.responsiblegambling.vic.gov.au/__data/assets/pdf_file/0003/25572/Gainsbury_convergence_of_gambling_and_gaming_2015.pdf.

90. Abarbanel B, Rahman A. eCommerce market convergence in action: Social casinos and real money gambling. *UNLV Gaming Research and Review Journal*. 2015;19(1):51-62.

91. Lopez-Gonzalez H, Griffiths MD. Understanding the convergence of markets in online sports betting. *International Review for the Sociology of Sport*. 2016;53(7):807-23.

92. Jenkins H. *Convergence culture: Where old and new media collide*. New York, NY: New York University Press; 2006.

93. Gainsbury S, King D, Delfabbro P, Hing N, Russell A, Blaszcynski A, et al. The use of social media in gambling. Melbourne, Australia: Gambling Research Australia; 2015.

94. King D, Gainsbury SM, Delfabbro PH, Hing N, Abarbanel B. Distinguishing between gaming and gambling activities in addiction research. *Journal of Behavioural Addictions*. 2015;4(4):215-20.

95. Bellringer M, Garrett N, Kolandai-Matchett K, Abbott M. Offshore gambling by New Zealanders study. Auckland, New Zealand: Auckland University of Technology, Gambling and Addictions Research Centre; 2015.

96. King DL, Delfabbro PH, Kaptsis D, Zwaans T. Adolescent simulated gambling via digital and social media: An emerging problem. *Computers in Human Behavior*. 2014;31:305-13.

97. Parke J, Wardle H, Rigbye J, Parke A. Exploring social gambling: Scoping, classification and evidence review. London, UK: UK Gambling Commission; 2013. Available from: http://eprints.lincoln.ac.uk/16412/1/Social%20Gambling.pdf.

98. Dussault F, Brunelle N, Kairouz S, Rousseau M, Leclerc D, Tremblay J, et al. Transition from playing with simulated gambling games to gambling with real money: A longitudinal study in adolescence. *International Gambling Studies*. 2017;17(3):386-400.

99. Ferguson CJ. Evidence for publication bias in video game violence effects literature: A meta-analytic review. *Aggression and Violent Behavior*. 2007;12(4):470-82.

100. Ferguson CJ, San Miguel C, Garza A, Jerabeck JM. A longitudinal test of video game violence influences on dating and aggression: A 3-year longitudinal study of adolescents. *Journal of Psychiatric Research*. 2012;46(2):141-6.

101. Yin-Poole W. Now Belgium declares loot boxes gambling and therefore illegal. Eurogamer [Internet].[cited 2018 Jul 28]. Available from: https://www.eurogamer.net/articles/2018-04-25-now-belgium-declares-loot-boxes-gambling-and-therefore-illegal.

102. Kuchera B. Loot boxes are the video game issue of the year. Polygon [Internet]. 2017 Dec 14 [cited 2018 Jul 28]. Available from: www.polygon.com/2017-best-games/2017/12/14/16772900/loot-boxes-loot-crates-2017.

103. Sterling J. The year of the loot box (The Jimquisition). 2017 Nov 13 [cited 2018 Jul 28]. Available from: https://www.youtube.com/watch?v=NLDid1UNyg8

104. Dyer-Witheford N, De Peuter G. *Games of empire: Global capitalism and video games*. Minneapolis, MN: University of Minnesota Press; 2009.

105. Johnson MR, Luo Y. Gaming-value and culture-value: Understanding how players account for video game purchases. *Convergence: The International Journal of Research into New Media Technologies*. 2017.

106. Johnson MR. *The Unpredictability of Gameplay*. New York, NY: Bloomsbury Academic; 2018.

107. Williams JP, Smith JH. From moral panics to mature games research in action. In: Williams JP, Smith JH, editors. *The players' realm: Studies on the culture of video games and gaming*. Jefferson, NC: McFarland and Company; 2007. p. 1-15.

108. Rouner J. 4 Most ridiculous moral panics in video game history. Houston Press [Internet]. 2012 May 16 [cited 2018 Jul 28]. Available from: https://www.houstonpress.com/arts/4-most-ridiculous-moral-panics-in-video-game-history-6374719.

109. Ferguson C, Markey P. Please stop resurrecting the moral panic over video games and school shootings. *Washington Examiner* [Internet]. 2018 Jul 31 [cited 2018 Jul 28]. Available from: https://www.washingtonexaminer.com/opinion/op-eds/please-stop-resurrecting-the-moral-panic-over-video-games-and-school-shootings.

2.3 GAMBLING TYPES

Gambling comes in many different forms and types. Commercial gambling includes: lotteries, instant lotteries, number games (such as bingo and Keno), sports betting, horse betting, poker and other card games, casino table games (such as roulette and craps), bingo, and electronic gaming machines. All these forms of gambling, which further include many specific varieties, are available either in physical venues or via the Internet.[1]

A distinction is sometimes made between games of chance and games of skill. The distinction is based on whether adopting and practicing, or varying strategies, will affect the outcome or profitability of the game. This distinction does not take away a substantial chance component to the skill-based forms of gambling.[2] Studies also refer to this distinction as *strategic* (games of skill) versus *non-strategic* (games of chance) forms of gambling (e.g., Grant et al.[3]). Research from Western countries suggests that men generally prefer the former while women tend to prefer the latter (e.g., Gausset and Jansbøl,[4] Stark et al.,[5] Svensson et al.[6]). Notably, many people participate in both types of games, which can lead to a third group of "mixed" gamblers (e.g., Myrseth[7]).

The various forms of commercial gambling have evolved through a supply-and-demand process: gambling providers develop new products using new technologies (structural characteristics) with the aim of making people want to spend money on gambling (motivational characteristics). This process has resulted in some forms of gambling (e.g., EGMs) being more closely associated with harm than others[8, 9] (see Section 2.2 and 2.2.1 Gambling Exposure).

Specific forms of gambling differ with respect to *structural characteristics*.[10, 11] Many structural characteristics have been identified, and can be organized into some basic categories such as: timing parameters (including event frequency); reward parameters (e.g., jackpot size, return to player); presence of sensory (audiovisual) features; near-miss characteristics; and opportunities for illusory skill or control.

Technological innovation has led to many traditional forms of gambling becoming automated. For example, electronic forms of roulette are common in several jurisdictions. Automation can change the structural characteristics of the game; sensory feedback can be added to gameplay or the speed of play in computerized games may become faster. These modifications may increase the risk of harmful use.[12, 13]

Gambling forms—the commercial services or products offered on the leisure market—also differ with respect to consumer appeal, as each form fulfills different needs or provides different kinds of stimulation across individuals. People have different motivations for participating in gambling. *Motivation* here means "what animates us, what prompts our initiation, choice, and persistence in particular behaviours in particular environments".[14, p137] In this way, motivation refers to groups of psychological, environmental, and social factors.

The potential for harmful gambling arises from the interaction between the structural characteristics of gambling forms on the one hand, and players' motivations to participate in different types of games on the other (e.g., see Balodis, Thomas, and Moore,[15] Clarke,[16] Schüll,[17] Husain et al.[18]). The strength of the evidence for the influence of structural characteristics on harmful gambling is mixed. There is good evidence from experimental research that major structural characteristics modify gambling behaviour (e.g., persistence, bet size). This research builds upon classic work from psychological learning theory. By contrast, few studies have tested whether people with gambling problems are especially sensitive to these features, so the relevance to gambling harms is not clear.

With respect to motivational characteristics, there is evidence that most motivations of recreational gamblers may intensify or escalate to harmful levels of gambling.[19] Surveys of the general population that included questions on why people gamble have revealed a range of motives (e.g., Wardle et al.[20]). Some studies show how certain motives and personality characteristics relate to harmful involvement in specific forms of gambling.[15, 21-23]

2.3.1 STRUCTURAL CHARACTERISTICS

Gambling games differ from one another along a number of psychological dimensions termed structural characteristics.[10, 11] The better-studied characteristics have their origins in psychological learning theory and models of conditioning. In terms of *timing parameters*, one feature is the delay between the gamble and the outcome. In a lottery, there is a long delay (often days) between ticket purchase and outcome, and it is rarely possible to bet again immediately.[24] In other forms of gambling, including instant lotteries and EGMs, this delay may be a few seconds only, and a subsequent gamble can begin immediately.

In a study that equated other structural characteristics by using a simulated slot machine, people with gambling problems played a game with a two second spin delay for significantly more trials than a machine with a 10 second spin delay.[25] People with gambling problems reported less enjoyment and excitement at playing a slot machine where the game speed had been slowed down, and the sounds also removed.[26] A review of 11 studies[27] concluded that faster games were preferred and rated as more exciting. They were also especially attractive to people with gambling problems.

A number of parameters have been identified as shaping gambling behaviour. Increasing jackpot size (or prize level) increased excitement and physiological arousal during a horse-racing game.[28] In a study where EGM gamblers were observed in Australian gambling venues, EGM jackpot size predicted overall spending.[29] Beyond the maximum prize, EGMs can vary in the rate of reinforcement, and their overall profitability (referred to as *return to player* or *payback percentage*). EGM gamblers prefer machines that offer more frequent (but smaller) winning feedback (Parke and Griffiths,[30] Haw[31]) and can adjust their style of play to influence the reinforcement rate.[32] Payback percentage also varies across EGMs within a venue and/or jurisdiction.[33, 34] With extensive training, experienced EGM gamblers can distinguish between 'tight' (85% payback) and 'loose' EGMs (98% payback).[33] Finally, bonus features in EGMs, often in the form of "free spins," are an appealing feature.[30, 35]

Sensory stimulation (in terms of both light and sound) is a crucial component of winning feedback. Removal of auditory feedback to wins can reduce psychophysiological responses,[30, 35, 36] and has a stronger effect on game preferences among people with gambling

problems.[26] Within modern multiline slot machines, *losses disguised as wins* (LDWs) arise where a payout is awarded that does not cover the initial wager. These outcomes are accompanied by the sensory feedback of winning (see systematic review by Barton et al.[37]). LDWs increase physiological arousal and distort a player's memory for the number of true wins in a session.[38, 39] Regular EGM gamblers tend to prefer multiline machines over equivalent single-line games. Additionally, people with gambling problems describe multiline slot machines as being more immersive and requiring more skills than an equivalent single line game–seemingly because of the presence of LDWs.[40] In online casino games, LDWs increased the likelihood of gamblers continuing to bet, compared to 'full loss' outcomes.[41]

Within chance-based games, certain game features can promote an inappropriate belief that skill is involved (referred to as the *illusion of control*). Examples include: a choice of lottery numbers[42]; an instrumental action in the form of a dice throw;[43] the use of stop buttons on gambling machines;[44] or the use of familiar stimuli associated with sports or other skillful games.[45] Experiments where these features are manipulated by researchers show effects on gambling persistence[44] and risk-taking.[43, 46] Early wins in a gambling session can also cause the illusion of control.[45, 47] Problem gambling has been associated with higher scores on scales measuring the illusion of control,[48] and people with gambling problems have also shown overestimation of control in a laboratory task.[49]

Near-miss events should also be considered. A near-miss is a losing result that closely resembles a winning result (for this reason it could be considered a *near-win*). Studies that have varied the frequencies of near-misses in slot machine games describe higher levels of persistence at a moderate rate of near-misses around 30%.[50, 51] In laboratory studies, near-misses are rated as increasing motivation to continue playing,[52] and generate psychophysiological arousal[53, 54] (for a systematic review, see Barton et al.[55]). By imaging brain responses to near-misses, some studies have reported heightened sensitivity to near-misses in problem gamblers.[56]

2.3.2 MOTIVATIONAL CHARACTERISTICS

It is important to note that the reasons that people gamble vary from one type of game to another and there is also individual variation in the motivations of gamblers. Different types of games have evolved because they appeal to different motives for participating. In other words, they have specific motivational characteristics.

Although forms of gambling differ in many ways, they have one thing in common: the potential to win money. The desire to win money, therefore, may appear to be the most fundamental motivation of gamblers. Several studies indicate that this motive differs in importance among people who gamble recreationally versus people with gambling problems.[57-59] Recreational gamblers mainly seek experiences and other stimulation such as a chance to socialize or have an outing, whereas people with gambling problems place greater importance on and are more motivated by money. Many of those with gambling problems try to win back money that they have lost or have mistaken ideas that in the long run they will make money by gambling.

However, winning at gambling is an experience that goes beyond its pure monetary value.[19] Culturally and symbolically, winning is associated with success and happiness. Biologically, winning, as well as the anticipation of winning, stimulates the brain's reward system. Concepts relating to how cultural and biological factors contribute to harmful gambling are discussed further in Sections 3.1 and 3.4

In some forms of gambling, such as lotteries, it is possible to win an enormous amount of money for a small stake, although the probability of doing so is miniscule. An important motivation for entering the lotteries is to fantasize about winning big and living a much better life. While lotteries in most parts of the world are a relatively harmless form of gambling, people who are not content with their lives or in a desperate economic situation may spend large sums of money on lotteries in the unrealistic hope of *winning big*.[60, 61] On the other hand, some people may be driven by charitable motivations and participate in raffles and other types of charity-based gambling.

All forms of gambling can take place in a social context. For example, people buy lottery tickets together, play bingo with their friends, or spend an evening at the casino with their partner. Some forms of gambling *require* others to be present, such as live poker. Other forms are attractive because they gather large groups of people together in a physical venue, such as casinos, race tracks, and bingo halls.

The level of social interaction varies. It can range between gambling with close friends to gambling alone among strangers (e.g., Cotte and Latour,[62] Guillén, Garvía, and Santana,[63] Krauss,[64]). Sociologists have stressed the importance of gambling as a 'character contest', allowing people to show courage, "gameness", integrity, gallantry, and composure in front of others– at the gambling tables in casinos, or in other venues where behaviour and manners are easy to observe.[65]

Consequently, many types of gambling may appeal to a social motive for participating, but evidence is mixed on how it relates to harmful gambling.[66] On the one hand, people who feel socially marginalized or have a need for social recognition may be attracted by the social contexts of gambling and, therefore, spend more money and time gambling. On the other hand, gambling with or among other people may provide a form of social control.[67, 68] In other words, excessive gambling may be prevented because the person wishes to avoid disapproval from others.

Demonstrating skill and competing with others are two closely related motivations for gambling that constitute the core of games like sports betting and poker. Some forms of gambling–for example, roulette and EGMs–are basically governed by chance, but players may still believe that skill is involved and that there are strategies that make it possible to earn money (see Section 2.3.1 Structural Characteristics). If such beliefs are put into practice, the player will certainly lose money and be at risk of gambling harmfully. In other forms of gambling–for example, horse and sports betting–there is, in theory, a possibility for a skilled player to make money, though few do so in practice.

Gambling may become harmful when players overestimate their skill relative to others; interpret winnings as a result of skill and losses as a result of bad luck; and continue gambling with the belief that they will become more skillful and eventually make money gambling.[69-71] Whenever gambling is believed to involve skill, it may also be attractive to people who like to compete with others, for example, at the poker table or by being more knowledgeable in betting than others. Consequently, people who like competing may run the risk, if they start to gamble, to gamble excessively.[72, 73]

Because gambling can provide a thrill, *sensation seeking*–the desire to take risks in order to experience stimulation and excitement–may be another motive. The association between harmful gambling and such *enhancement motives* is well known (e.g., Balodis et al.,[15] Bonnaire et al.,[21] and Mishra, Lalumière, and Williams[67]). High stakes casino gambling is an example of a type of gambling that has evolved in order to satisfy a need for thrill and excitement.

Gambling may also have a tranquilizing effect by providing a means of escape or distraction from troubles in the gambler's life, including anxiety, depression, or boredom.[74, 75] Specifically, gambling games may bring about a dissociative state of mind, also termed *immersion*,[40] the *machine zone*,[17] or *dark flow*. [76] This state may be most common in continuous, repetitive forms of gambling, such as bingo and EGMs. Players who prefer these forms may be motivated to seek this state (e.g., Balodis et al.,[15] Husain et al.,[18] and Thomas et al.[77]).

The mood altering effects of gambling–providing a thrill or an opportunity to escape and dissociate– are motivations for harmful participation that are explained by classic psychological theories of positive and negative reinforcement. These motivations are central components in several models of problem gambling (e.g., Blaszczynski and Nower, [78] and Stewart and Zack[79]). From this perspective, the presence of harmful gambling with other psychological disorders is explained by the latter disorders being an underlying cause of excessive involvement in gambling.

Almost all researchers agree that some forms of gambling are more closely associated with harmful gambling than others. As already discussed, lotteries are generally regarded to be relatively harmless, while EGMs are often closely associated with harmful gambling. Indications of the riskiness of various forms of gambling can be obtained from the analyses of data from prevalence studies;[80] from statistics about the games played by those who seek help for harmful gambling; from risk assessment instruments (Section 2.4.3); and, from the analysis of gambling companies' data on their customers' gambling behaviour.[81] It is important to keep in mind that the riskiness of a particular form of gambling is relative and the amount of harm that it causes can vary depending on what other games are available in a gambling market at a given point in time.[80]

Participating in many different forms of gambling is associated with a higher risk of problem gambling[8] because it suggests a higher intensity of gambling, which is an intrinsic aspect of problem gambling. It may also be that participation in many forms of gambling increases the risk of starting to gamble harmfully, because the various forms all have their specific risk factors.

REFERENCES

1. Arthur JN, Williams RJ, Delfabbro PH. The conceptual and empirical relationship between gambling, investing, and speculation. *Journal of Behavioural Addictions*. 2016;5(4):580-91.

2. Reber AS. The EVF model: A novel framework for understanding gambling and, by extension, poker. *UNLV Gaming Research and Review Journal*. 2012;16(1):59-76.

3. Grant JE, Odlaug BL, Chamberlain SR, Schreiber LR. Neurocognitive dysfunction in strategic and non-strategic gamblers. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*. 2012;38(2):336-40.

4. Gausset Q, Jansbøl K. "Tell me what you play and I will tell you who you are": Values and gambling habits in two Danish universities. *International Gambling Studies*. 2009;9(1):67-78.

5. Stark S, Zahlan N, Albanese P, Tepperman L. Beyond description: Understanding gender differences in problem gambling. *Journal of Behavioral Addictions*. 2012;1(3):123-34.

6. Svensson J, Romild U, Nordenmark M, Månsdotter A. Gendered gambling domains and changes in Sweden. *International Gambling Studies*. 2011;11(2):193-211.

7. Myrseth H, Brunborg GS, Eidem M, Pallesen S. Description and pre-post evaluation of a telephone and internet based treatment programme for pathological gambling in Norway: A pilot study. *International Gambling Studies*. 2013;13(2):205-20.

8. Binde P, Romild U, Volberg RA. Forms of gambling, gambling involvement and problem gambling: Evidence from a Swedish population survey. *International Gambling Studies*. 2017;17(3):490-507.

9. Markham F, Young M, Doran B. The relationship between player losses and gambling-related harm: Evidence from nationally representative cross-sectional surveys in four countries. *Addiction*. 2016;111(2):320-30.

10. Griffiths M. Fruit machine gambling: The importance of structural characteristics. *Journal of Gambling Studies*. 1993;9(2):101-20.

11. Parke J, Parke A, Blaszcynski A. Key issues in product-based harm minimisation: Examining theory, evidence and policy issues relevant in Great Britain. London, UK: Responsible Gambling Trust; 2016.

12. Armstrong T, Rockloff M, Greer N, Donaldson P. Rise of the machines: A critical review on the behavioural effects of automating traditional gambling games. *Journal of Gambling Studies*. 2017;33(3):735-67.

13. Goodwin B, Thorne H, Langham E, Moskovsky N. Traditional and innovated gambling products: An exploration of player preferences. *International Gambling Studies*. 2017;17(2):219-35.

14. Bernard LC, Mills M, Swenson L, Walsh RP. An evolutionary theory of human motivation. *Genetic, Social, and General Psychology Monographs*. 2005;131(2):129-84.

15. Balodis SRS, Thomas AC, Moore SM. Sensitivity to reward and punishment: Horse race and EGM gamblers compared. *Personality and Individual Differences*. 2014;56:29-33.

16. Clarke D. Motivational differences between slot machine and lottery players. *Psychological Reports*. 2005;96(3):843-8.

17. Schüll ND. *Addiction by design: Machine gambling in Las Vegas*. Princeton, NJ: Princeton University Press; 2012.

18. Husain F, Wardle H, Kenny T, Balajaran M, Collins D. Examining machine player behaviour: A qualitative exploration. London, UK: NatCen Social Research; 2013. Available from: https://www.bl.uk/collection-items/examining-machine-player-behaviour-a-qualitative-exploration.

19. Binde P. Gambling in Sweden: The cultural and socio-political context. *Addiction*. 2013;109(2):193-8.

20. Wardle H, Moody, A., Spence, S., Orford, J., Volberg, R., Jotangia, D., … Dobbie, F. . British Gambling Prevalence Survey 2010. London, UK: National Centre for Social Research; 2011. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/243515/9780108509636.pdf.

21. Bonnaire C, Bungener C, Varescon I. Pathological gambling and sensation seeking–How do gamblers playing games of chance in cafés differ from those who bet on horses at the racetrack? *Addiction Research and Theory*. 2006;14(6):619-29.

22. Francis KL, Dowling NA, Jackson AC, Christensen DR, Wardle H. Gambling motives: Application of the reasons for gambling questionnaire in an Australian population survey. *Journal of Gambling Studies*. 2015;31(3):807-23.

23. Holtgraves T. Gambling, gambling activities, and problem gambling. *Psychology of Addictive Behaviors*. 2009;23(2):295-302.

24. Rogers P. The cognitive psychology of lottery gambling: A theoretical review. *Journal of Gambling Studies*. 1998;14(2):111-34.

25. Choliz M. Experimental analysis of the game in pathological gamblers: effect of the immediacy of the reward in slot machines. *Journal of Gambling Studies*. 2010;26(2):249-56.

26. Loba P, Stewart SH, Klein RM, Blackburn JR. Manipulations of the features of standard video lottery terminal (VLT) games: Effects in pathological and non-pathological gamblers. *Journal of Gambling Studies*. 2001;17(4):297-320.

27. Harris A, Griffiths MD. The impact of speed of play in gambling on psychological and behavioural factors: A critical review. *Journal of Gambling Studies*. 2018;34(2):393-412.

28. Wulfert E, Franco C, Williams K, Roland B, Maxson JH. The role of money in the excitement of gambling. *Psychology of Addictive Behaviors*. 2008;22(3):380-90.

29. Browne M, Langham E, Rockloff MJ, Li E, Donaldson P, Goodwin B. EGM Jackpots and player behaviour: an in-venue shadowing study. *Journal of Gambling Studies*. 2015;31(4):1695-714. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/egm-jackpots-and-player-behaviour-an-in-venue-shadowing-study

30. Parke J, Griffiths M. The psychology of the fruit machine: The role of structural characteristics (revisited). *International Journal of Mental Health and Addiction*. 2006;4(2):151-79.

31. Haw J. The relationship between reinforcement and gaming machine choice. *Journal of Gambling Studies*. 2008;24(1):55-61.

32. MacLaren VV. Experienced EGM players know how to control the reinforcement rate and time on device. *Journal of Gambling Studies*. 2015;31(4):1789-98.

33. Dixon MJ, Fugelsang JA, MacLaren VV, Harrigan KA. Gamblers can discriminate 'tight' from 'loose' electronic gambling machines. *International Gambling Studies*. 2013;13(1):98-111. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/gamblers-can-discriminate-tight-from-loose-electronic-gambling-machines

34. Woolley R, Livingstone C, Harrigan K, Rintoul A. House edge: Hold percentage and the cost of EGM gambling. *International Gambling Studies*. 2013;13(3):388-402.

35. Taylor LF, Macaskill AC, Hunt MJ. Realistic free-spins features increase preference for slot machines. *Journal of Gambling Studies*. 2017;33(2):555-77.

36. Dixon MJ, Harrigan KA, Santesso DL, Graydon C, Fugelsang JA, Collins K. The impact of sound in modern multiline video slot machine play. *Journal of Gambling Studies*. 2014;30(4):913-29.

37. Barton KR, Yazdani Y, Ayer N, Kalvapalle S, Brown S, Stapleton J, et al. The effect of losses disguised as wins and near misses in electronic gaming machines: A systematic review. *Journal of Gambling Studies*. 2017;33(4):1241-60.

38. Dixon MJ, Harrigan KA, Sandhu R, Collins K, Fugelsang JA. Losses disguised as wins in modern multi-line video slot machines. *Addiction*. 2010;105(10):1819-24.

39. Jensen C, Dixon MJ, Harrigan KA, Sheepy E, Fugelsang JA, Jarick M. Misinterpreting 'winning' in multiline slot machine games. *International Gambling Studies*. 2013;13(1):112-26.

40. Dixon MJ, Graydon C, Harrigan KA, Wojtowicz L, Siu V, Fugelsang JA. The allure of multi-line games in modern slot machines. *Addiction*. 2014;109(11):1920-8. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/allure-multi-line-games-modern-slot-machines

41. Leino T, Torsheim T, Pallesen S, Blaszczynski A, Sagoe D, Molde H. An empirical real-world study of losses disguised as wins in electronic gaming machines. *International Gambling Studies*. 2016;16(3):470-80.

42. Langer EJ. The illusion of control. *Journal of Personality and Social Psychology*. 1975;32(2):311-28.

43. Ladouceur R, Mayrand M. The level of involvement and the timing of betting in roulette. *Journal of Psychology*. 1987;121(2):169-76.

44. Ladouceur R, Sevigny S. Structural characteristics of video lotteries: Effects of a stopping device on illusion of control and gambling persistence. *Journal of Gambling Studies*. 2005;21(2):117-31.

45. Burger JM. Desire for control and the illusion of control: The effects of familiarity and sequence of outcomes. *Journal of Research in Personality*. 1986;20(1):66-76.

46. Dixon MR, Hayes LJ, Ebbs RE. Engaging in "illusory control" during repeated risk-taking. *Psychological Reports*. 1998;83(3):959-62.

47. Langer EJ, Roth J. Heads I win, tails it's chance: The illusion of control as a function of the sequence of outcomes in a purely chance task. *Journal of Personality and Social Psychology*. 1975;32(6):951-5.

48. Moore SM, Ohtsuka K. Beliefs about control over gambling among young people, and their relation to problem gambling. *Psychology of Addictive Behaviors*. 1999;13(4):339-47.

49. Orgaz C, Estevez A, Matute H. Pathological gamblers are more vulnerable to the illusion of control in a standard associative learning task. *Frontiers in Psychology*. 2013;4:306.

50. Cote D, Caron A, Aubert J, Desrochers V, Ladouceur R. Near wins prolong gambling on a video lottery terminal. *Journal of Gambling Studies*. 2003;19(4):433-8.

51. Kassinove JI, Schare ML. Effects of the "near miss" and the "big win" on persistence at slot machine gambling. *Psychology of Addictive Behaviors*. 2001;15(2):155-8.

52. Clark L, Lawrence AJ, Astley-Jones F, Gray N. Gambling near-misses enhance motivation to gamble and recruit win-related brain circuitry. *Neuron*. 2009;61(3):481-90.

53. Clark L, Crooks B, Clarke R, Aitken MRF, Dunn BD. Physiological responses to near-miss outcomes and personal control during simulated gambling. *Journal of Gambling Studies*. 2012;28(1):123-37.

54. Dixon MJ, Harrigan KA, Jarick M, MacLaren V, Fugelsang JA, Sheepy E. Psychophysiological arousal signatures of near-misses in slot machine play. *International Gambling Studies*. 2011;11(3):393-407.

55. Barton KR, Yazdani A, Ayer N, Kalvapalle S, Brown S, Stapleton J, et al. The effect of losses disguised as wins and near misses in electronic gaming machines: A systematic review. *Journal of Gambling Studies*. 2017;33(4):1241-60.

56. Sescousse G, Janssen LK, Hashemi MM, Timmer MH, Geurts DE, Ter Huurne NP, et al. Amplified striatal responses to near-miss outcomes in pathological gamblers. *Neuropsychopharmacology*. 2016;41(10):2614-23.

57. Back KJ, Lee CK, Stinchfield R. Gambling motivation and passion: A comparison study of recreational and pathological gamblers. *Journal of Gambling Studies*. 2011;27(3):355-70.

58. Lee CK, Chung N, Bernhard BJ. Examining the structural relationships among gambling motivation, passion, and consequences of internet sports betting. *Journal of Gambling Studies*. 2014;30(4):845-58.

59. Marmurek HH, Switzer J, D'Alvise J. A comparison of university student and community gamblers: Motivations, impulsivity, and gambling cognitions. *Journal of Behavioral Addictions*. 2014;3(1):54-64.

60. Beckert J, Lutter M. Why the poor play the lottery: Sociological approaches to explaining class-based lottery play. *Sociology*. 2012;47(6):1152-70.

61. Hicks G. *Fate's bookie: How the lottery shaped the world*. Stroud, UK: The History Press; 2009.

62. Cotte J, Latour KA. Blackjack in the kitchen: Understanding online versus casino gambling. *Journal of Consumer Research*. 2009;35(5):742-58.

63. Guillen MF, Garvia R, Santana A. Embedded play: Economic and social motivations for sharing lottery tickets. *European Sociological Review*. 2011;28(3):344-54.

64. Krauss F. Taking the points: The socialization process of a sports book "regular". Las Vegas, NV: Center for Gambling Research, University of Nevada; 2010.

65. Goffman E. *Where the action is: Three essays*. London, UK: Allen Lane - The Penguin Press; 1969.

66. Quinlan CK, Goldstein AL, Stewart SH. An investigation of the link between gambling motives and social context of gambling in young adults. *International Gambling Studies*. 2013;14(1):115-31.

67. Mishra S, Lalumière ML, Williams RJ. Gambling as a form of risk-taking: Individual differences in personality, risk-accepting attitudes, and behavioral preferences for risk. *Personality and Individual Differences*. 2010;49(6):616-21.

68. Rockloff MJ, Greer N. Audience influence on EGM gambling: the protective effects of having others watch you play. *Journal of Gambling Studies*. 2011;27(3):443-51.

69. Browne M, Rockloff MJ, Blaszcynski A, Allcock C, Windross A. Delusions of expertise: The high standard of proof needed to demonstrate skills at horserace handicapping. *Journal of Gambling Studies*. 2015;31(1):73-89.

70. Cantinotti M, Ladouceur R, Jacques C. Sports betting: Can gamblers beat randomness? *Psychology of Addictive Behaviors*. 2004;18(2):143-7.

71. Gilovich T. Biased evaluation and persistence in gambling. *Journal of Personality and Social Psychology*. 1983;44(6):1110-26.

72. Harris N, Newby J, Klein RG. Competitiveness facets and sensation seeking as predictors of problem gambling among a sample of university student gamblers. *Journal of Gambling Studies*. 2015;31(2):385-96.

73. Parke A, Griffiths M, Irwing P. Personality traits in pathological gambling: Sensation seeking, deferment of gratification and competitiveness as risk factors. *Addiction Research and Theory*. 2009;12(3):201-12.

74. Cartmill T, Slatter T, Wilkie B. The role of anxiety and dissociation in young australian gamblers. *Journal of Gambling Studies*. 2015;31(4):1215-26. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/role-anxiety-and-dissociation-young-australian-gamblers

75. Porter J, Ungar J, Frisch GR, Chopra R. Loneliness and life dissatisfaction in gamblers. Journal of Gambling Issues [Internet]. 2004; (11). Available from: https://doi.org/10.4309/jgi.2004.11.13.

76. Dixon MJ, Stange M, Larche CJ, Graydon C, Fugelsang JA, Harrigan KA. Dark flow, depression and multiline slot machine play. *Journal of Gambling Studies*. 2018;34(1):73-84. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/the-relationship-between-dark-flow-depression-and-multiline-slot-machines

77. Thomas AC, Sullivan GB, Allen FCL. A theoretical model of EGM problem gambling: More than a cognitive escape. *International Journal of Mental Health and Addiction*. 2008;7(1):97-107.

78. Blaszczynski A, Nower L. A pathways model of problem and pathological gambling. *Addiction*. 2002;97(5):487-99.

79. Stewart SH, Zack M. Development and psychometric evaluation of a three-dimensional Gambling Motives Questionnaire. *Addiction*. 2008;103(7):1110-7.

80. Binde P. What are the most harmful forms of gambling? Analyzing problem gambling prevalence surveys - CEFOS Working Paper 12. Gothenburg, Sweden: Center for Public Sector Research, University of Gothenburg; 2011.

81. Chagas BT, Gomes JFS. Internet gambling: A critical review of behavioural tracking research. *Journal of Gambling Issues* [Internet]. 2017; (36)27 p.]. Available from: https://doi.org/10.4309/jgi.v0i36.3987.

2.4 GAMBLING RESOURCES

In the following sections, we discuss resources that can reduce the risk of developing gambling-related harm and that can reduce such harms after they occur, along with factors relevant to the successful implementation of these resources: service access and use; harm reduction, prevention, and protection; and interventions including psychotherapy, pharmacotherapy, mutual support, and self-help.

The strength of the evidence for the benefits of gambling resources varies considerably. Most evidence to date consists of evaluations of psychotherapy, although there is also growing evidence for mutual support and self-guided treatments. Although gaps remain, a number of reviews support the benefits of some of these resources. On the other hand, there is less evidence for the impact of biological treatments, as well as harm reduction and prevention programming.

2.4.1 SERVICE ACCESS AND USE

Prevention and resolution of problems are approached differently depending upon the environment. This is generally true for a variety of personal struggles, and specifically true in relation to gambling harms. Environments may differ in the extent to which public attitudes encourage individual self-determination, self-care, and healthy living. Environments can also vary in the support available for people who are at risk or currently experiencing harms associated with gambling.

For example, doctors, teachers, clergy, and financial institution employees may be expected to support people who are struggling with a variety of problems—including gambling-related harm. There may be similar expectations for families to support or care for family members dealing with gambling-related problems. Finally, an important question is the extent to which someone is expected to solve problems on his or her own without support. The answer can vary based on the specific society and its cultural values.

Therefore, a variety of psychological and environmental factors influence the degree to which people access gambling resources. Researchers have long observed that even resources with a track record of success are underused. Estimates suggest that only 7 to 12% of problem gamblers seek treatment for their difficulties.[1]

Many barriers to service access and use have been identified. These include practical issues (e.g., geographical, financial, and time constraints) and psychological concerns (e.g., shame, guilt, concerns regarding stigma or privacy).[2] Culturally and linguistically appropriate support may be particularly challenging to find. Most recent research suggests that gamblers are unaware of the services available to them, and

that the cost of services and cultural relevance are particularly important to making use of services.[3] The preferred mode of gambling – whether land-based or online – may also influence help-seeking behaviour.[4]

2.4.2 HARM REDUCTION, PREVENTION, AND PROTECTION

The legal and social environment may support harm reduction policies that limit exposure to gambling risks. Yet, there is little research on how useful other programs and policies such as public awareness campaigns are in promoting responsible gambling behaviours. As outlined in Section 2.2.1 Accessibility, a variety of harm reduction approaches have been proposed and introduced in different jurisdictions.

Some jurisdictions have well-developed public health models and school-based prevention programs that address gambling. Others use a variety of approaches such as self-exclusion programs within gambling venues; limiting the number and location of gambling outlets in a region; restricting trading hours; banning smoking in venues; preventing credit betting; enforcing age restrictions; offering voluntary or mandatory pre-commitment; reducing maximum bet limits; removing Automated Teller Machines (ATMs); and, lowering prize levels.

However, jurisdictions can also promote more exposure to gambling even as they try to reduce harm. Direct advertising and marketing by industry operators, and indirect promotion through the portrayal of gambling in films, television, and other media can make gambling seem to be an attractive and glamorous leisure activity. In some countries, such as Australia, the telecast of sports events includes reporting the odds offered by online and telephone sports betting operators, coupled with gambling-oriented commercials. Online betting company logos and advertisements are placed in prominent positions on the sporting field and players' uniforms often include advertising linking them to the gambling industry.

Overall, research on prevention programs is limited. Two comprehensive reviews suggest that the most commonly used prevention initiatives are the least effective, whereas more promising efforts have not been implemented sufficiently.[5, 6] Yet, most of these initiatives have not been evaluated by researchers, which prevents definitive statements regarding their impact.[7] A more recent review highlighted the promise of several strategies – including pop-up messages and restrictions on bet sizes, bank machines, tobacco use, and operating hours – as well as the need for formal evaluations of these strategies.[8] Such evaluations can provide invaluable guidance for policy development in this area. For example, pop-up messages that often involve warning messages of potentially risky play seem to be most effective when they are presented in the centre of electronic gaming machine screens, when they interrupt play, and when they require players to actively remove them.[9]

Public awareness and information campaigns have yet to include specific safe gambling guidelines.[10-12] These efforts to influence attitudes and knowledge prior to gambling seem to have less impact compared to strategies that target the features of gambling products and venues during gambling (e.g., warning messages), or resources made available following gambling (e.g., self-exclusion[13]). For example, kiosks in gambling venues known as responsible gambling

centres have been associated with greater knowledge but not with a change in behaviour,[14] whereas self-exclusion, although under-used, does result in less gambling and improved well-being.[15-17]

2.4.3 RISK ASSESSMENT

There is no overall agreement on a classification of structural characteristics or the exact number of risk dimensions that exist.[18, 19] Nevertheless, a number of *risk assessment tools* have been developed with the aim of estimating the harms associated with any specific gambling product. Risk assessment instruments rate various forms of gambling on a scale from relatively harmless to relatively harmful. These ratings are based on factors identified through research on contributors to harmful gambling. The factors may be given different weights depending on how important they are for the overall risk potential. Each factor in any given form of gambling is rated on this scale and the sum of the weighted ratings is calculated. If a particular form of gambling is found to be unacceptably risky, some of the rated factor(s) can be modified so as to lower the risk potential.

For example, AsTERiG (*Tool to evaluate the risk potential of different gambling types*[19, 20]) generates a score based on ten factors: event frequency; multigame/stake opportunities; chance to win more than what has been staked; light and sound effects; variable stake size; availability; jackpot; cash out interval; near-miss; and continuity of the game. Two further instruments, GamGard[21] and Tools for Responsible Games (TRG – Airas)[22] were developed by a British firm and Finnish researchers, respectively. GamGard includes ten factors while the TRG includes 50 indicators across nine dimensions.

Gambling companies belonging to the World Lottery Association are currently the main users of GamGard,[23] while AsTERiG and TRG are used only by a few European companies. Some regulatory authorities also use GamGard to identify more harmful types of gambling. Technological developments may require the introduction of new variables into these schemes. As an alternative or complement to risk assessment instruments, gambling companies increasingly use artificial intelligence systems to identify patterns of at-risk and problem gambling among their customers.

2.4.4 INTERVENTIONS

Although not everyone who experiences gambling-related harms needs formal treatment services, some people do often benefit from them. The availability of treatment can vary substantially across jurisdictions, and a comprehensive treatment system should include a variety of treatment methods and intensities that are supported by research evidence. These treatments may include individual, group, telephone, or web-based psychotherapy, outpatient day programs, or residential services. In some jurisdictions, many of these services are available as part of mental health treatment systems, and in others, they are offered as part of addiction treatment or are free standing services. This has implications for who can access treatment and at what level of distress and harm they access it.

A growing body of research has focused on the value of specific intervention strategies, primarily psychotherapy. Results continue to show the value of cognitive behavioural treatment approaches and motivational interviewing, with more limited benefits for pharmacological and other approaches.

Relatively little research has compared different types of gambling interventions (e.g., psychotherapy versus pharmacotherapy, self-help versus mutual support). Studies have consistently shown that in person treatments are more helpful than other treatment types, and that all treatments (particularly mutual support and self-help) are beneficial for those who participate fully.[24] Indeed, the amount of improvement increases with the number of exercises completed and sessions attended across treatment types, highlighting the importance of being engaged in the treatment, as well as the nature of the treatment itself.

There is currently not enough research evidence at this time to support newly developed innovative treatment alternatives, including biological interventions such as neurostimulation (e.g., repetitive transcranial magnetic stimulation[25]) or psychosocial interventions such as cognitive remediation.[26]

Psychotherapy: Research supports the value of psychotherapy in treating problem gambling.[24] Cognitive behavioural approaches in particular are beneficial, regardless of the type of gambling in question.[27] An important systematic review and meta-analysis of 14 studies reported that the bulk of psychotherapy research in this context has evaluated cognitive behavioural therapy, and shows a medium to very large positive effect in the short-term.[28] A more recent systematic review of 21 studies supported these conclusions, although they noted some methodological issues that prevented a rigorous test of the long-lasting benefits in many cases.[29] Cognitive behavioural treatments target dysfunctional thoughts about gambling using both cognitive and behavioural strategies.[30] Notably, cognitive behavioural therapy provided as part of routine treatment in everyday settings appears to show the same strong effects as you would see in highly controlled treatment studies.[31]

Motivational interviewing approaches have gained support, although fewer studies have been conducted in this area. These studies have often included participants with less severe gambling at the outset and treatments of shorter length than might be usual.[28, 29] An early meta-analysis indicated a modest advantage of cognitive therapy over motivational interviewing and another type of treatment, imaginal desensitization.[27] A more recent and focused meta-analysis of motivational interviewing for problem gambling showed a small but significant positive effect of this treatment.[32]

Since such a small proportion of people with problem gambling seek treatment (ranging from 7-12%), brief interventions are being evaluated more often as a possible approach to reducing gambling-related harms, especially when people have less severe gambling involvement and problems. All of the reviews noted above[28, 29, 32] included treatments that were brief in duration, and showed the potential helpfulness of even single session treatments, as well as treatments with little or no therapist interaction at all (see also Swan and Hodgins[33]). For example, Toneatto[34] had similar clinical outcomes in problem gamblers who were randomly chosen to receive a single session of psychotherapy versus six sessions of cognitive therapy, behaviour therapy, or motivational therapy. Even limited in-person or telephone-based therapist guidance has promoted abstinence from gambling during and after self-guided treatment using online or print materials.[35-37] Telephone-based interventions are also linked to improvements in problem gambling and the associated harms, providing further support for these cost-effective and accessible treatment alternatives.[38]

Most recently, a meta-analysis has supported mindfulness-based approaches in the reduction of gambling behaviours, urges, and symptoms.[39] This analysis combined interventions incorporating mindfulness (e.g., dialectical behavioural therapy) and imaginal desensitization (which has similarities to mindfulness based procedures but does not include meditation). Other rigorous trials have found similar outcomes between cognitive-behavioural and mindfulness-based interventions.[40]

It has often been noted that there is an ongoing need for rigorous and controlled studies of problem gambling interventions (e.g., Smith, Dunn, Harvey, Battersby and Pols[41]), particularly those examining the maintenance of long-term therapeutic effects. Psychotherapy research for problem gambling continues to grow, with an increasing focus on identifying new treatment approaches or enhancements that may be helpful for people with gambling problems. Further, research has long recognized the high level of comorbid mental illness and addictions in those with gambling problems, and how this effects engagement in and response to treatment.[42] Depression and alcohol use, for example, are strong predictors of negative responses to psychological treatments.[43] The need for the development and evaluation of integrated treatment approaches is therefore seen as essential, since existing knowledge in this area is limited.[44, 45]

Pharmacotherapy: There is currently no medication approved for the treatment of problem gambling. An early meta-analysis of 16 studies suggested that medications are more effective than placebo control or no treatment, but that three classes of medication (opioid antagonists, antidepressant medications, and mood stabilizers) did not differ in their impact on gambling difficulties.[46] More recent reviews have continued to highlight opioid antagonists as well as glutamatergic agents.[47] The most recent meta-analysis demonstrated that only opioid antagonists are more effective than placebo control and with a small effect. The different medication classes generally showed similar impacts on clinical outcomes, however, causing these authors to conclude that limited support for medication to treat problem gambling currently exists.[48]

Overall, then, neurobiological models and the treatment studies to date provide the greatest support for opioid antagonists such as naltrexone in the treatment of problem gambling.[49-51] This medication class is proposed to affect dopamine pathways implicated in reward processing, and has the most evidence for usefulness and tolerability to date.[52] Still, experts have emphasized the importance of considering co-occurring psychiatric illness when making treatment decisions. Opioid antagonists may be particularly well-suited to people who also have substance use disorders, whereas antidepressant medications or mood stabilizers could be more appropriate for those with depressive/anxious or bipolar disorders.[53] Combined treatment approaches that include both pharmacotherapy and psychotherapy may also be appropriate in some cases. For example, in a recent study group, cognitive behavioural therapy and antidepressant medication was associated with greater treatment adherence than either of these treatments alone.[54]

Mutual Support: In mutual support groups, recovering problem gamblers help each other to stop gambling harmfully or to stop gambling completely. The main activity of such groups is regular meetings in which the participants take turns in talking about how their gambling problems started and progressed, and about their current recovery, while other participants provide advice. The collective knowledge and experience of the group is used to help people in a wide variety of ways, including: providing social and emotional support; maintaining the motivation to abstain; gaining insight into the nature of gambling problems; and getting practical advice on how to stay away from

gambling.[55] The importance of telling one's problem gambling story, and listening to the stories of others, suggests that the narrative – as a social and cultural construction – is central to the recovery process. It helps the person gain a better understanding of his or her condition, and a direction leading to recovery.[55-57]

The most well-known mutual support society of problem gamblers is Gamblers Anonymous (GA), which began in the United States and has spread to many other countries. GA is modelled after Alcoholics Anonymous (AA) and shares many of its features such as the medical model of addiction and the principle of total abstinence. It differs in some ways, like having a broader view on spirituality.[58] The "Twelve Step" approach of AA and GA – for example, that there is a higher power that gives strength in recovery and that one has to learn to live a new life – has been adopted by many treatment providers.[59]

In some countries, such as Sweden, the Netherlands and Spain, there are mutual support societies not belonging to GA that have their own ideologies and practices.[55, 60] In addition, there are support and counselling groups formed on the initiative of health agencies (e.g., Piquette-Tomei et al[61]).

Mutual support may be the only available local form of help or in some cases, the form that people prefer. It may also be a complement to traditional psychotherapy or a way of staying away from harmful gambling after the end of therapy. Mixed evidence exists for the therapeutic benefits of GA,[62] but it has been suggested that attendance, engagement, and social support may be crucial to maximizing its positive effects.[63] Further, a combination of traditional psychotherapy and GA attendance has been found to have therapeutic benefits.[64, 65] Members of GA report high levels of satisfaction and the use of GA to support relapse prevention and abstinence goals, but this must be seen in the context of these participants having themselves chosen to belong to the GA.[66]

Self-help: The vast majority of people who have addictive behaviours – from substance misuse to harmful gambling – reduce or stop those behaviours, most commonly in a self-guided manner.[67] Resources to support self-help take various forms, including: online and print exercises, workbooks and manuals; audio and video recordings; and telephone, computer, or web-based programs. These types of resources can make a difference: for example, a recent study of self-guided cognitive behavioural therapy showed improvements for all outcomes.[68] Recent research suggests that self-guided treatments may be less effective than face-to-face interventions, although authors noted that most self-help options evaluated were brief in duration or intensity, and that longer programs had more impact.[69] Research has increasingly highlighted the value of Internet-based self-help in delivering psychotherapy such as cognitive behavioural therapy, as well as sharing information about problem gambling, in a convenient, private, and cost-effective way. Studies of online and mobile interventions are rapidly expanding. Reviews are generally supportive of the value of these interventions.[70] Notably, this research was not included in a recent review for several reasons, including the incorporation of therapist assistance, the lack of gambling outcomes, and interestingly, the idea of personalized feedback as secondary prevention (in part due to its frequent evaluation in non-treatment-seeking samples[71]). These highlight the importance of how we define and evaluate these interventions, and how we interpret research syntheses in this area.

REFERENCES

1. Slutske WS. Natural recovery and treatment-seeking in pathological gambling: Results of two U.S. national surveys. *American Journal of Psychiatry*. 2006;163(2):297-302.

2. Khayyat-Abuaita U, Ostojic D, Wiedemann A, Arfken CL, Ledgerwood DM. Barriers to and reasons for treatment initiation among gambling help-line callers. *Journal of Nervous and Mental Disease*. 2015;203(8):641-5.

3. Gainsbury S, Hing N, Suhonen N. Professional help-seeking for gambling problems: Awareness, barriers and motivators for treatment. *Journal of Gambling Studies*. 2014;30(2):503-19.

4. Hing N, Russell AM, Gainsbury SM, Blaszczynski A. Characteristics and help-seeking behaviors of internet gamblers based on most problematic mode of gambling. *Journal of Medical Internet Research*. 2015;17(1):13.

5. Williams RJ, West BL, Simpson RI. Prevention of problem and pathological gambling: A comprehensive review of the evidence. Guelph, ON: Gambling Research Exchange Ontario; 2008. Available from: https://www.uleth.ca/dspace/bitstream/handle/10133/414/2008-Prevention-OPGRC.pdf?sequence=7.

6. Williams RJ, West BL, Simpson RI. Prevention of problem gambling: A comprehensive review of the evidence and identified best practices. Guelph, ON: Gambling Research Exchange Ontario; 2012. Available from: https://www.uleth.ca/dspace/handle/10133/3121.

7. Drawson AS, Tanner J, Mushquash CJ, Mushquash AR, Mazmanian D. The use of protective behavioural strategies in gambling: A systematic review. *International Journal of Mental Health and Addiction*. 2017;15(6):1302-19.

8. Tanner J, Drawson AS, Mushquash CJ, Mushquash AR, Mazmanian D. Harm reduction in gambling: A systematic review of industry strategies. *Addiction Research and Theory*. 2017;25(6):485-94. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/review-of-industry-strategies-for-reducing-harm-from-gambling

9. Ginley MK, Whelan JP, Pfund RA, Peter SC, Meyers AW. Warning messages for electronic gambling machines: Evidence for regulatory policies. *Addiction Research and Theory*. 2017;25(6):495-504.

10. Currie SR, Hodgins DC, Casey DM, El-Guebaly N, Smith GJ, Williams RJ, et al. Deriving low-risk gambling limits from longitudinal data collected in two independent Canadian studies. *Addiction*. 2017;112(11):2011-20.

11. Currie SR, Miller N, Hodgins DC, Wang J. Defining a threshold of harm from gambling for population health surveillance research. *International Gambling Studies*. 2009;9(1):19-38.

12. Quilty LC, Avila Murati D, Bagby RM. Identifying indicators of harmful and problem gambling in a Canadian sample through receiver operating characteristic analysis. *Psychology of Addictive Behaviors*. 2014;28(1):229-37.

13. Ariyabuddhiphongs V. Problem gambling prevention: before, during, and after measures. *International Journal of Mental Health and Addiction*. 2013;11(5):568-82.

14. Boutin C, Tremblay N, Ladouceur R. Impact of visiting an Onsite Casino Information Centre on perceptions about randomness and gambling behaviours. *Journal of Gambling Studies*. 2009;25(3):317-30.

15. Gainsbury SM. Review of Self-exclusion from Gambling Venues as an Intervention for Problem Gambling. *Journal of Gambling Studies*. 2014;30(2):229-51.

16. Kotter R, Kraplin A, Pittig A, Buhringer G. A systematic review of land-based self-exclusion programs: Demographics, gambling behavior, gambling problems, mental symptoms, and mental health. *Journal of Gambling Studies*. 2018. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/changes-in-gambling-behaviour-and-mental-health-after-enrolling-in-land-based-sel

17. Ladouceur R, Shaffer P, Blaszczynski A, Shaffer HJ. Responsible gambling: A synthesis of the empirical evidence. *Addiction Research and Theory*. 2016;25(3):225-35. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/a-review-of-existing-evidence-for-responsible-gambling-practices

18. Griffiths M. Fruit machine gambling: The importance of structural characteristics. *Journal of Gambling Studies*. 1993;9(2):101-20.

19. Meyer G, Fiebig M, Häfeli J, Mörsen C. Development of an assessment tool to evaluate the risk potential of different gambling types. *International Gambling Studies*. 2011;11(2):221-36.

20. Blanco C, Blaszczynski A, Clement R, Derevensky J, Goudriaan AE, Hodgins DC, et al. Assessment Tool to Measure and Evaluate the Risk Potential of Gambling Products, ASTERIG: A Global Validation. *Gaming Law Review and Economics*. 2013;17(9):635-42.

21. Griffiths MD, Wood RTA, Parke J. GAM-GaRD: A new social responsibility tool. *National Council of Problem Gambling National News*. 2008;11(3):7.

22. Airas A. Tool for responsible gambling. RAY Finnish Slot Machine Association; 2011.

23. Cousins JB. Evaluation of Gamgard: A tool to identify gaming risks to vulnerable players under 'normal' playing conditions. Ottawa, ON: Centre for Research on Educational and Community Services, University of Ottawa; 2018 [cited 2018 Sep 24]. Available from: https://crecs.uottawa.ca/sites/crecs.uottawa.ca/files/gamgard_evaluation_report_-_final.pdf

24. Pallesen S, Mitsem M, Kvale G, Johnsen BH, Molde H. Outcome of psychological treatments of pathological gambling: A review and meta-analysis. *Addiction*. 2005;100(10):1412-22.

25. Makani R, Pradhan B, Shah U, Parikh T. Role of repetitive transcranial magnetic stimulation (rTMS) in treatment of addiction and related disorders: A systematic review. *Current Drug Abuse Reviews*. 2017;10(1):31-43.

26. Challet-Bouju G, Bruneau M, Victorri-Vigneau C, Grall-Bronnec M. Cognitive remediation interventions for gambling disorder: A systematic review. *Frontiers in Psychology*. 2017;8:1961.

27. Gooding P, Tarrier N. A systematic review and meta-analysis of cognitive-behavioural interventions to reduce problem gambling: Hedging our bets? *Behaviour Research and Therapy*. 2009;47(7):592-607.

28. Cowlishaw S, Merkouris S, Dowling N, Anderson C, Jackson A, Thomas S. Psychological therapies for pathological and problem gambling. *Cochrane Database of Systematic Reviews*. 2012;11:CD008937.

29. Petry NM, Ginley MK, Rash CJ. A systematic review of treatments for problem gambling. *Psychology of Addictive Behaviors*. 2017;31(8):951-61.

30. Chretien M, Giroux I, Goulet A, Jacques C, Bouchard S. Cognitive restructuring of gambling-related thoughts: A systematic review. *Addictive Behaviors*. 2017;75:108-21.

31. Smith DP, Fairweather-Schmidt AK, Harvey PW, Battersby MW. How does routinely delivered cognitive-behavioural therapy for gambling disorder compare to "gold standard" clinical trial? *Clinical Psychology and Psychotherapy*. 2018;25(2):302-10.

32. Yakovenko I, Quigley L, Hemmelgarn BR, Hodgins DC, Ronksley P. The efficacy of motivational interviewing for disordered gambling: Systematic review and meta-analysis. *Addictive Behaviors*. 2015;43:72-82.

33. Swan J, Hodgins D. Brief interventions for disordered gambling. *Canadian Journal of Addiction*. 2015;6(2):29-36.

34. Toneatto T. Single-session interventions for problem gambling may be as effective as longer treatments: Results of a randomized control trial. *Addictive Behaviors*. 2016;52:58-65. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/brief-treatment-one-session-effective-longer-treatments-problem-gambling

35. Campos MD, Rosenthal RJ, Chen Q, Moghaddam J, Fong TW. A self-help manual for problem gamblers: The impact of minimal therapist guidance on outcome. *International Journal of Mental Health and Addiction*. 2015;14(4):579-96.

36. Carlbring P, Degerman N, Jonsson J, Andersson G. Internet-based treatment of pathological gambling with a three-year follow-up. *Cognitive Behavioural Therapy*. 2012;41(4):321-34.

37. Carlbring P, Smit F. Randomized trial of internet-delivered self-help with telephone support for pathological gamblers. *Journal of Consulting and Clinical Psychology*. 2008;76(6):1090.

38. Tse S, Campbell L, Rossen F, Wang C-W, Jull A, Yan E, et al. Face-to-face and telephone counseling for problem gambling. *Research on Social Work Practice*. 2012;23(1):57-65.

39. Maynard BR, Wilson AN, Labuzienski E, Whiting SW. Mindfulness-based approaches in the treatment of disordered gambling. *Research on Social Work Practice*. 2015;28(3):348-62.

40. McIntosh CC, Crino RD, O'Neill K. Treating problem gambling samples with cognitive behavioural therapy and mindfulness-based interventions: A clinical trial. *Journal of Gambling Studies*. 2016;32(4):1305-25.

41. Smith DP, Dunn KI, Harvey PW, Battersby MW, Pols RG. Assessing randomised clinical trials of cognitive and exposure therapies for gambling disorders: A systematic review. *Behaviour Change*. 2013;30(03):139-58.

42. Maniaci G, La Cascia C, Picone F, Lipari A, Cannizzaro C, La Barbera D. Predictors of early dropout in treatment for gambling disorder: The role of personality disorders and clinical syndromes. *Psychiatry Research*. 2017;257:540-5.

43. Merkouris SS, Thomas SA, Browning CJ, Dowling NA. Predictors of outcomes of psychological treatments for disordered gambling: A systematic review. *Clinical Psychology Review*. 2016;48:7-31. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/review-individual-and-treatment-characteristics-affect-treatment-outcomes-disordered

44. Dowling NA, Merkouris SS, Lorains FK. Interventions for comorbid problem gambling and psychiatric disorders: Advancing a developing field of research. *Addictive Behaviors*. 2016;58:21-30.

45. Linnet J, Jeppsen Mensink M, de Neergaard Bonde J, Winterdahl M. Treatment of gambling disorder patients with comorbid depression. *Acta neuropsychiatrica*. 2017;29(6):356-62.

46. Pallesen S, Molde H, Arnestad HM, Laberg JC, Skutle A, Iversen E, et al. Outcome of pharmacological treatments of pathological gambling: A review and meta-analysis. *Journal of Clinical Psychopharmacology*. 2007;27(4):357-64.

47. Grant JE, Odlaug BL, Schreiber LR. Pharmacological treatments in pathological gambling. *British Journal of Clinical Psychology*. 2014;77(2):375-81.

48. Bartley CA, Bloch MH. Meta-analysis: Pharmacological treatment of pathological gambling. *Expert Rev Neurother*. 2013;13(8):887-94.

49. Bullock SA, Potenza MN. Pathological gambling: Neuropsychopharmacology and treatment. *Current Psychopharmacology*. 2012;1(1):67-85.

50. Bullock SA, Potenza MN. Update on the pharmacological treatment of pathological gambling. *Current Psychopharmacology*. 2013;2(3):204-11.

51. Mouaffak F, Leite C, Hamzaoui S, Benyamina A, Laqueille X, Kebir O. Naltrexone in the treatment of broadly defined behavioral addictions: A review and meta-analysis of randomized controlled trials. *European Addiction Research*. 2017;23(4):204-10.

52. Christensen DR. A review of opioid-based treatments for gambling disorder: An examination of treatment outcomes, cravings, and individual differences. *International Gambling Studies*. 2018;18(2):286-309.

53. Yip SW, Potenza MN. Treatment of gambling disorders. *Current Treatment Options in Psychiatry*. 2014;1(2):189-203.

54. Choi SW, Shin YC, Youn H, Lim SW, Ha J. Pharmacotherapy and group cognitive behavioral therapy enhance follow-up treatment duration in gambling disorder patients. *Annals of General Psychiatry*. 2016;15(20).

55. Binde P. A Swedish mutual support society of problem gamblers. *International Journal of Mental Health and Addiction*. 2011;10(4):512-23.

56. Nuske E, Hing N. A narrative analysis of help-seeking behaviour and critical change points for recovering problem gamblers: The power of storytelling. *Australian Social Work*. 2013;66(1):39-55.

57. Venuelo C, Marinaci T. The social construction of the pathological gambler's identity and its relationship with social adaptation: Narratives from members of Italian Gambling Anonymous and Gam-Anon family groups. Journal of Gambling Issues [Internet]. 2017; (36)138-63 pp.]. Available from: https://jgi.camh.net/index.php/jgi/article/view/3985/4169.

58. Browne BR. The selective adaptation of the alcoholics anonymous program by Gamblers Anonymous. *Journal of Gambling Studies*. 1991;7(3):187-206.

59. Ferentzy P, Skinner W, Antze P. Gamblers Anonymous and the 12 Steps: How an informal society has altered a recovery process in accordance with the special needs of problem gamblers. Journal of Gambling Issues [Internet]. 2009; (23)42-65 pp.]. Available from: https://doi.org/10.4309/jgi.2009.23.3.

60. Binde P. Why people gamble: A model with five motivational dimensions. *International Gambling Studies*. 2012;13(1):81-97.

61. Piquette-Tomei NA, Norman E, Dwyer SC, McCaslin E. Group therapy for women problem gamblers: A space of their own. Journal of Gambling Issues [Internet]. 2008; (22)275-96 pp.]. Available from: https://doi.org/10.4309/jgi.2008.22.8.

62. Schuler A, Ferentzy P, Turner NE, Skinner W, McIsaac KE, Ziegler CP, et al. Gamblers Anonymous as a recovery pathway: A scoping review. *Journal of Gambling Studies*. 2016;32(4):1261-78.

63. Oei TP, Gordon LM. Psychosocial factors related to gambling abstinence and relapse in members of Gamblers Anonymous. *Journal of Gambling Studies*. 2008;24(1):91-105.

64. Marceaux JC, Melville CL. Twelve-step facilitated versus mapping-enhanced cognitive-behavioral therapy for pathological gambling: A controlled study. *Journal of Gambling Studies*. 2011;27(1):171-90.

65. Petry NM. Gamblers Anonymous and cognitive-behavioral therapies for pathological gamblers. *Journal of Gambling Studies*. 2005;21(1):27-33.

66. McGrath DS, Kim HS, Hodgins DC, Novitsky C, Tavares H. Who are the anonymous? Involvement and predictors of Gamblers Anonymous attendance among disordered gamblers presenting for treatment. *Journal of Gambling Studies*. 2018;24(1):91-105.

67. Bishop FM. Self-guided change: The most common form of long-term, maintained health behavior change. Health Psychology Open [Internet]. 2018; 5(1)14 p.]. Available from: https://doi.org/10.1177/2055102917751576.

68. Oei TPS, Raylu N, Lai WW. Effectiveness of a self help cognitive behavioural treatment program for problem gamblers: A randomised controlled trial. *Journal of Gambling Studies*. 2018;34(2):581-95.

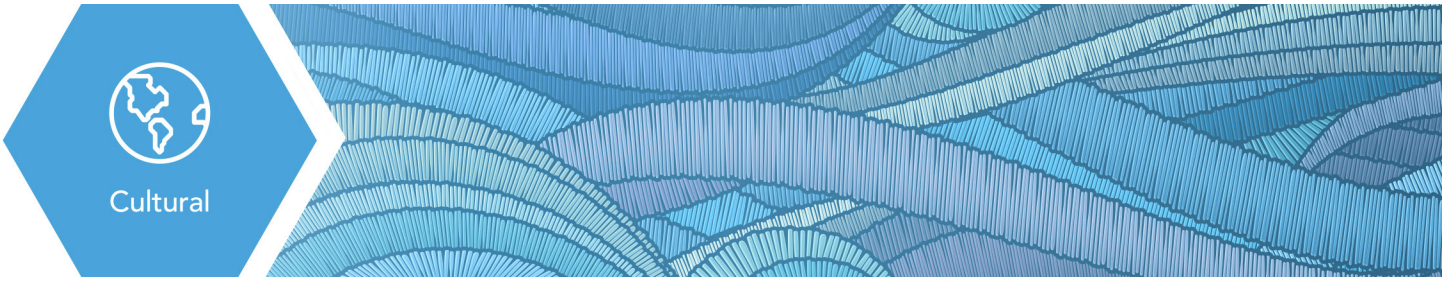
69. Goslar M, Leibetseder M, Muench HM, Hofmann SG, Laireiter AR. Efficacy of face-to-face versus self-guided treatments for disordered gambling: A meta-analysis. *Journal of Behavioral Addictions*. 2017;6(2):142-62.

70. Chebli JL, Blaszczynski A, Gainsbury SM. Internet-based interventions for addictive behaviours: A systematic review. *Journal of Gambling Studies*. 2016;32(4):1279-304.

71. Giroux I, Goulet A, Mercier J, Jacques C, Bouchard S. Online and mobile interventions for problem gambling, alcohol, and drugs: A systematic review. *Frontiers in Psychology*. 2017;8:954.

3. Discussion of General Factors Contributing to Harmful Gambling

This section discusses four categories of General actors (cultural, social, psychological, and biological) depicted in the framework. The factors represent major areas of influence that are relevant across the four Gambling-Specific harms already described. Each category of factors is defined and described in the subsections below.



3.1 CULTURAL FACTORS

In this section we outline Cultural Factors that contribute to harmful gambling. Culture is the shared system of thought, meaning, and morality of a people or ethnic group. It is demonstrated in norms, customs, collective knowledge, symbols, myths, and rituals. Attitudes and traditions may differ among groups within a culture, but the contrasts are shaped by the overall cultural system. A subculture is a variation within a culture, comparable to a dialect of a language.

Through its central influence on meanings and values, culture can affect the prevalence of gambling, the popularity of various gambling types, thoughts about and attitudes towards gambling, how people gamble, and the extent of harmful gambling. It may also affect the consequences of gambling problems and treatment outcomes.[1-9]

The functions and meanings of gambling can vary both within and across cultures. Gambling can be regarded as personal entertainment; a social activity; an escape from daily life; a hobby requiring skill; a way to test one's luck; a quick way to make money; or something shameful. While some cultural meanings and values may increase the risk of people engaging in harmful gambling, others are likely to decrease the risk. In this section we outline Cultural Factors that contribute to harmful gambling, including: ethnicity and traditions, indigenous groups, socio-cultural attitudes, religion and other belief systems, and gender.

Gambling behaviour and the rate of harmful gambling may differ across ethnic groups within the same jurisdiction.[10] More research is needed to understand what causes this variation, but some studies of certain ethnic groups propose that religion, attitudes, beliefs, acculturation processes, and other cultural factors contribute to the differences (e.g., Forrest and Wardle,[11] Kim[12]). Prevalence studies also typically show that gambling and harmful gambling vary with gender, class, and age. This suggests that cultural factors are involved and there are some studies that explore these (e.g., Clarke and Clarkson;[13] Corney and Davis[14]). Gambling seems to produce and reinforce gender structures. While it is important to identify gender-based differences, the overall similarities between women and men should also be recognized to avoid reinforcing stereotypical images of gender, since other life circumstances and contexts are influential too.

Studies of the cultural meanings and symbolism of gambling are relatively few and mostly consist of qualitative investigations using ethnographic, historical, or interpretative approaches (for a review of the literature, see Binde,[15, p44-57] which includes additional research references such as: Casey;[16] Fisher;[17] Malaby;[18] McMillen;[19] and, Neal[20]).

3.1.1 ETHNICITY AND TRADITIONS

We have already acknowledged that views on gambling vary among peoples and cultural traditions. These views can range from gambling being a fully acceptable activity or even the norm in certain social occasions, to inappropriate and suspect in other cases. Population surveys often show that foreign-born individuals have higher rates of harmful gambling. However, neither minority ethnic groups nor migrant groups are a homogeneous, single group. The cultures and traditions of their countries of origin, and different processes of acculturation, must be considered.

While harmful gambling prevalence may be relatively high in some ethnic groups, it may still be less common among parts of the group than in the host society. This is often due to gambling being viewed negatively, especially by women, as discussed in Section 3.1.6 Gender. Other factors that lead to a reduced level of harmful gambling include less involvement in commercial forms of gambling and a lack of money to spend on gambling. Therefore, many groups show *bimodal* patterns of gambling. In other words, the group as a whole gambles relatively little, but those members who gamble do so heavily and experience high rates of gambling problems.[12, 21, 22] These are likely sectors of populations in the early stages of introduction to commercial gambling.

In the case of immigrant groups, higher rates of harmful gambling may have several causes. One category of causes is related to the culture and traditions of the country of origin. The immigrant group may belong to a culture where views on luck, fortune, and destiny increase the risk of harmful gambling or the level of probabilistic thinking (i.e., considering probabilities when making decisions about uncertain events) is generally lower.[23] In these cultures, gambling may be common and accepted, with heavy gambling less likely to be seen as a problem by gamblers and the people around them.

Another reason for harmful gambling is that some migrant cultures place great value on the possession and display of wealth, which attracts people to the world of gambling where large amounts of money rapidly change hands. In contrast, some cultures consider gambling to be so shameful that people may hesitate to talk about or seek help for gambling problems. Finally, in certain cultures there may not be much gambling but if immigrants then move to a host society with plenty of gambling, they may develop unrealistic expectations of making money; this, in turn, could lead to excessive gambling. Previously mentioned theories of exposure and adaptation may also be relevant for these individuals.

The experience of migration and of life in the host country may also contribute to higher rates of harmful gambling. Some people may experience feelings of discomfort due to being uprooted, a perceived loss of social status, altered family roles in the new country, and feeling excluded and discriminated against. These psychological strains may cause them to rely on gambling to relax, dissociate, or spend time in a gambling subculture, all of which increase the risk of harmful gambling.[24, 25] Migrant groups also often include refugees who have suffered physical and emotional trauma and are characterized by high rates of gambling problems. However, little is known about the precise link between trauma and harmful gambling.

Immigrants or refugees may have a socioeconomically disadvantaged position in the host society that, in itself, constitutes a risk factor for harmful gambling, as discussed in Section 3.2 Social Factors. Newcomers to the host country can also experience high unemployment rates and gambling becomes a way to fill the time and experience levels of excitement not normally found in daily life. For immigrants, casinos may become a place to meet with compatriots, as they are perceived to be welcoming, safe, multi-cultural settings not based on drinking alcohol or meeting men or women.[6]

In summary, gambling problems among immigrants can arise in the interaction among having roots in another culture, the experience of migration, and the process of integration into the host society. Thus, immigrants themselves do not constitute a problem in relation to gambling. In the case of indigenous minority ethnic groups, the main reason for elevated rates of harmful gambling is commonly believed to be the result of the often marginalized and disadvantaged socioeconomic position of such groups.[26, 27]

3.1.2 INDIGENOUS PEOPLES

Indigenous Peoples refers to those who have occupied lands and territories before the arrival of settler societies. Indigenous Peoples recognize histories-social, cultural, economic, and political systems that may not be recognized by settler societies who achieved dominance through mechanisms of conquest, settlement, and land cessions.[28] Indigenous Peoples is a term that can be problematic in application since Indigenous Peoples may have a preference to self-identify with their own tribal, ethnic, or group name and may not recognize the term itself. For this reason, the United Nations does not adopt an official definition. Indigenous Peoples share socioeconomic experiences with vulnerable or disempowered groups in complex societies with the critical exception that Indigenous Peoples assert rights due to their historical connections to their original territories. They also experience a wide range of economic, social, and health inequalities including mental health disorders and addictions.[29-33]

Some state societies may formally recognize Indigenous rights to lands or self-determination through Treaties or State Constitutions, while other state societies may not recognize Indigenous Peoples or rights. Through the process of globalization, Indigenous Peoples have an international voice through the United Nations Permanent Forum and the United Nations Declaration on the Rights of Indigenous Peoples,[34] which advocates for decolonization.

The colonized and political position of Indigenous Peoples situates the challenge in understanding harm in Indigenous gambling. Historical understandings of gambling are generally limited to archaeological, missionary, and early settler accounts, as well as ethnographic descriptions. For instance, in North America, archaeological evidence indicates the existence of gambling forms such as dice.[35, p89] In historical missionary accounts, in, Canada, the Jesuit Relations documents harm in gambling among the Huron (*Wendat*) Peoples resulting in suicide and social tension.[36, p81] Aside from harmful effects of gambling, there are also narrative missionary accounts of harm management of gambling, such as discouraging the gambling of certain personal possessions such as among the Piikani (*Piegan*).[37, p159] The accuracy of settler descriptions should be interpreted with caution. They may overemphasize harm as a colonial strategy to construct an image of the inferiority of Indigenous Peoples. Nevertheless, historical descriptions offer evidence of Indigenous gambling practice.

Oral traditions and Indigenous languages may also provide a glimpse of the placement of gambling as an Indigenous practice such as in oral historical legends and language. Among the United States' Navajo there is an oral tradition of the mythic Gambler,[35, p87-124] and among the Anishinaabe (*Ojibwa*) in the United States and Canada, there are verb forms meaning "to gamble".[38] These gambling accounts reveal the subtleties in understanding harm from a cultural perspective. For instance, the Navajo Gambler narrative evokes the potential for harm in gambling, while in

the Anishinaabe language, verb forms indicate the possibility of losing it all in betting (*ibid*). Aside from these Indigenous expressions, a total understanding of the effect pre-colonial Indigenous gambling had on the people and communities is lacking. In their review of relevant research, Williams, Steven and Nixon[39] concluded this form of gambling was for ritualistic, spiritual, recreational, and social instances, and any adverse effects were not typical of what happens in contemporary Indigenous gambling.

One reason for this may be the strong communal focus of Indigenous societies. It appears gambling served as a way to redistribute resources in some situations. Individuals and groups who lost probably also received support from families and their broader communities more often than is the case in more individualist societies. Other studies and reviews appear to be consistent with the view that pre-colonial gambling was generally more benign than participating in some of the more recent forms that have primarily replaced it.[26, 40-42]

While North American Indigenous Peoples gambled in pre-colonial times, in other instances, some Indigenous groups such as the Māori did not gamble,[43] and in other instances, gambling is a relatively recent cultural practice such as among Indigenous Australians.[44]

The historical and ethnographic research suggests that in societies with gambling, specific attributes were more likely to be present such as money, large concentrations of people, social complexity, leisure time, no religious gambling prohibitions, and inter-tribal or inter-community relationships.[45] The extent to which pre-colonial original gambling forms spread through cultural contact or developed independently is uncertain without a complete historical record.

Whatever their origins, it is clear that gambling activities are interconnected with other aspects of culture and society in complex ways and have different meanings and purposes in different societies. Among other things, Indigenous gambling offered people and communities a way to achieve and challenge prestige. It also provided a means of recreation, promoting social interaction, and redistributing wealth within egalitarian communities. Often, gambling played ceremonial, ritualistic, and spiritual roles. For example, it could help divine the future, determine future actions, and engage supernatural forces.[39]

There are a number of studies of gambling and harm in gambling with Indigenous Peoples in the United States, Canada, Greenland, Australia, and New Zealand.[26, 27, 33, 39, 46-53] In some of these studies, overall participation rates were similar to rates for the general population; in others, they were higher. In both situations, there are typically differences in frequency of participation, preferred gambling activities, and level of expenditure. A New Zealand study (NGS)[46, 47] included a large, nationally representative Māori sample. Overall, past year participation was similar for Māori and non-Indigenous; however, Māori participated more often in specific activities, including card games, Keno, bingo, instant lottery tickets, and EGMs. They also participated more often in continual forms of gambling (weekly or more frequently), engaged in multiple gambling activities, and lost significant amounts of money when gambling.

Higher participation in card games and bingo, as well as higher weekly participation and gambling expenditure, has been found in previous New Zealand surveys of Māori populations.[21, 54] Some studies involving a variety of other Indigenous Peoples have similar findings.[26, 27, 39]

Indigenous Peoples with and without pre-colonial gambling histories now generally have high rates of participation, including high participation in gambling activities associated with the development of problem gambling. Nevertheless, prior experience of Indigenous gambling may influence attitudes towards contemporary gambling and have implications for harm.[39] According to the adaptation hypothesis, the lack of prior exposure to gambling may also contribute to vulnerability to gambling harm.

Consistent with the participation findings, many studies report that Indigenous minority populations experience very high levels of gambling-related harm. Problem gambling rates are typically two to three times higher than in the general population and some studies have found other significant differences.[6, 26, 33, 39, 47, 55] While many of these studies involve small samples and have a variety of methodological shortcomings, their findings are consistent across diverse jurisdictions.

Some reasons are proposed in relevant research regarding high rates of problem gambling and related harm.[26, 39] Given the scarcity of relevant longitudinal research though, explanations for problem development have to be considered with caution. Possible reasons for higher rates of harm include increased availability of and participation in high-risk forms of gambling; lack of prior exposure; conducive cultural beliefs; social marginalization and disadvantage; psychological state and stress; and demographic profile. For example, in the NGS study mentioned earlier,[46, 47] the Māori had a high rate of frequent EGM involvement as well as involvement with regular gambling activities in general. The prevalence of problem gambling among Māori, after adjustment for age, was four times the non-Indigenous rate.

In New Zealand, EGM venues are heavily concentrated in neighbourhoods of lower socioeconomic status and, as already noted, proximity to venues can be significantly related to both EGM participation and problem gambling. Proportionately more Māori reside in these neighbourhoods, and it is likely that high availability contributes to high EGM participation and problem gambling prevalence. In the NGS, EGM preference and regular participation were significant predictors of problem gambling.

In addition to Indigeneity, many social and demographic factors are associated with problem gambling including male gender; younger age; lack of formal qualifications; unemployment; no religious group affiliation; household size; low income; and-living in deprived neighbourhoods. Membership in these high-risk groups overlaps considerably, with Māori significantly over-represented in a number of them.

When all of these factors were considered together, being Māori or a Pacific Islander, emerged as the significant risk factor, followed by younger age. These findings suggest that while demographic differences, gambling exposure/availability, and disadvantage are important in explaining large problem gambling prevalence rates among Māori, Indigeneity in the context of colonialization is also a factor.

Relative to the general population, problem gamblers in the NGS reported many more major adverse life events, greater social deprivation, more health problems, psychological distress, and substance use and misuse. Many studies have found similarly high rates of comorbidity among problem gamblers.[32, 56-59]

Consistent with their histories of colonization, oppression, and persistent social disadvantage, Māori and other Indigenous Peoples experience high exposure to a

variety of stressful situations and have high rates of physical and mental health problems. It is unclear how these factors link to gambling participation and the extent to which they contribute to and result from changes in gambling participation and problems. Additional study with inclusion of Māori researchers may lead to answers by integrating emic perspectives.

The colonized position and social and political marginality of Indigenous Peoples have revealed unexpected outcomes in some studies, finding economic impacts that are in part contributing to the cumulative harmful effects of gambling. Manitowabi[60] found gambling revenue contributed to Indigenous community infrastructure, education, and employment, and enhanced social services and Indigenous agency in navigating the colonial relationship with the Canadian state. Other studies have come to similar conclusions, which merit reflection in understanding harm in a holistic perspective.[61, 62]

3.1.3 SOCIO-CULTURAL ATTITUDES

General attitudes towards gambling vary over time and may fluctuate between permissive and disapproving. One reason for the variation is that modes of gambling and attitudes towards gambling tend to reflect the morals and values that sustain socioeconomic systems. As these systems change, attitudes towards gambling also change.

One example is the shift from industrial society to consumer society. In the European industrializing societies of the nineteenth and early twentieth centuries, gambling was negatively portrayed as detrimental to work motivation (Bourgeois critique). At the same time, it was seen as harmful to the working-class movement, bringing irrational and individualistic hopes of becoming rich to people who could fight for social and economic justice instead (socialist critique; Dixon;[63] Husz;[64] McKibbin[65]). Gambling was also viewed as having detrimental consequences for workers in terms of money and time wasted. With the emergence of the consumer society in the mid-twentieth century, these negative views gradually gave way to a more positive view of gambling as an acceptable leisure pursuit.

Another possible cause for the variation in societal attitudes towards gambling is a cyclical process of excess and disapproval. "A period of liberalization and increased gambling among the population reaches a climax of excess, causing a backlash of disapproval and restrictions of gambling opportunities. People gamble less, but then the passion for gambling intensifies again, the cycle is completed, and the process repeats itself."[66, p55] Such a cyclical pattern has been observed in North America, Europe, and elsewhere.[67, 68]

The general attitude towards gambling in society is assumed to have an impact on harmful gambling in several ways. A permissive and accepting attitude will go hand in hand with an increase in the prevalence and intensity of gambling. According to the total consumption model,[69] this will lead to an increase in the prevalence of harmful gambling. A more specific mechanism may be that the normalization of intense gambling makes it less likely that the gambling excesses of individuals are criticized by people around them, which reduces the social pressure to gamble responsibly.

The perception of gambling varies across a number of sociocultural groupings, including social classes, political orientations, and age groups, which are further discussed below. These varying perceptions are assumed to have an impact on harmful gambling by making it more or less likely that people engage in intense gambling and/or in forms of gambling that are particularly likely to produce harm.

Political orientations: are rooted in moral values that influence the perception of gambling. For example, a liberal political view often accepts gambling as the choice of the individual and favours a liberal regulation of the gambling market. Socialist and conservative political views often disapprove of gambling due to beliefs in absolute moral values that conflict with gambling.

Social classes: are characterized by specific configurations of sociocultural values that can shape the perception of gambling. For example, among American working-class men in the 1960s, gambling was seen as a masculine activity that enabled expressions of courage and comradeship.[70] The aristocracies of eighteenth France and Russia were typically involved in high stakes gambling, often of a competitive nature.[71, 72] At the same time, they often disapproved of gambling among the "lower" classes. The cultural elite of contemporary European societies, however, tend to view gambling as an irrational and vulgar form of entertainment for those they consider to be less educated (see Section 3.2.1 Social Demographics). Some forms of gambling are associated with specific social classes. For example, in Western societies bingo is seen as an activity for women who are low income earners, while traditionally in Europe, roulette and baccarat are associated with the upper classes.

Demographics: People born during the same general time period (i.e., "cohorts") tend to hold distinct cultural values. Throughout their life, people in age cohorts carry some of the values that were instilled in their formative childhood and teenage years. Age groups also tend to have relatively stable values. For example, over the last half century, "teenage culture" has been characterized by challenging accepted values, risk-taking, and going to the extremes in lifestyle. The "golden years" of retirement, on the other hand, are characterized by a slow pace of life and plenty of leisure. Age groups therefore tend to differ in terms of both perceptions of and preferences for various forms of gambling.

3.1.4 RELIGION AND OTHER BELIEF SYSTEMS

Religions have varying views on gambling. Local and polytheistic religions may have a positive view – including representations of gambling in ritual and myth, and gambling having a spiritual dimension – but the large monotheistic religions tend to disapprove of gambling.[71-73] Islam forbids gambling and Lutheran churches have traditionally condemned it, as have Mormons and Jehovah's Witnesses. Roman Catholicism does not disapprove of gambling as such, but warns about its excesses.

For a century or more, formal religion has been on the decline in secularizing Western societies. However, religious sentiments and beliefs tend to take new forms as people still wish to connect with and probe the realm of the transcendental, existential, and mystical. Gambling, to some extent, can provide such a connection.[71-73] For the individual, gambling may have a spiritual and existential dimension that contributes to excessive gambling.[74-76] Gambling may also fill an existential void and become important for situating oneself in society's value system, embodying hopes of social acceptance, success, and living a better life.[77]

Spirituality and faith may also help people to overcome gambling problems. For instance, spirituality is a cornerstone of the mutual support organization Gamblers Anonymous and twelve-step treatment programs.[78] Some therapists and scholars maintain that treatment of excessive gambling should include spirituality and the person's broader and deeper life concerns.[77, 79, 80]

Following a religious faith that disapproves of gambling can help to protect against harmful gambling, since it makes it less likely that a person will gamble.[81, 82] If the person does gamble anyway, the intensity is likely to be lower. Participation in activities pertaining to such religions is one of the few identified protective factors against developing gambling problems.[83, 84] Still, at the population level, some groups may show a bimodal pattern where overall participation in gambling is relatively low, while at the same time there is a higher than average prevalence of problem gambling. This is especially true of some ethnic minority groups where factors other than religiosity influence attitudes towards gambling (Abbott et al.,[46, 47] see Section 3.1.1 Ethnicity and Traditions).

Magical thinking may also be part of religious beliefs or held separately. In the latter case it may take the form of "half-beliefs", which are ideas that influence thinking and behaviour even though people may admit that the ideas are irrational.[85] Many ideas and practices of a magical character have been documented in relation to gambling (e.g., Henslin;[86] Teed, Finlay, Marmurek, Colwell, and Newby-Clark;[87] D'Agati;[88] Kim, Ahlgren, Byun and Malek[89]). It is not clear to what extent such beliefs inspire people to gamble or are a product of gambling that enhances the experience of play by conferring a mystical dimension to it. Regardless of their origin, magical beliefs may contribute to harmful involvement in gambling; for example, the gambler may believe that it is his or her lucky day and a big win is likely to come. Some research suggests that in certain societies such beliefs exist together with a lower level of probabilistic thinking.[23]

3.1.5 GAMBLING CULTURES

A specific gambling culture may also evolve at some gambling venues. Most often, this can take place at racetracks, casinos, and sports betting facilities where some gamblers spend many hours a week at a single venue. They get to know other gamblers and employees and, over time, collectively create specific ways of interacting, special vocabularies, and norms of conduct, as well as local lore of events and people, creating a subculture or a 'social world'.[90-95]

Subcultures of varying size and complexity may also develop in other specific venues and contexts, including in slot machine and arcade halls,[17] bingo halls,[96] and online poker.[97] Involvement in gambling subcultures can be very rewarding to people but it typically implies that they spend a substantial amount of time and money on gambling.

If someone's social life outside the gambling venue is unrewarding and frustrating, he or she may be drawn toward a more satisfying social world in the gambling venue.[98] This could help to explain results from longitudinal studies, which show that people with gambling problems who participate in on-track horse betting seem to have especially persistent problems (e.g., Abbott, Volberg, and Rönnberg,[99]). Not only do they have to stop betting to become free of gambling problems, but they also need to leave the social world of the race track.

3.1.6 GENDER

Gender refers to cultural, social, and historical understandings and interpretations of the biological concept of sex. A gender perspective recognizes the conditions under which men and women live with regard to power, resources, divisions of labour, and leisure as well as construction of femininities and masculinities. Gender interacts with other social factors like class, ethnicity, and sexuality, and permeates institutional, social, and cultural patterns as well as personal relationships.[100]

Even though men and women share many similarities with respect to harmful gambling, there are some differences in their gambling habits, motivations, problem gambling rates, and how and why gambling problems develop. The frequency of gambling participation and amount of money spent on gambling is often higher for men than for women.[101-106] This is true for both youth and adults.[104, 107]

In many cultures, gambling is, or has been, viewed as a more acceptable activity for men than women, and this extends to specific game types. This reflects traditional gender roles and may generate *symbolic capital*.[108] Symbolic capital refers to the resources available to a person on the basis of honour, prestige, or recognition that create value in certain situations.[109] Masculinity may generate social status/symbolic capital through, for example, high-stakes risky gambling or gambling in male dominated environments;[110, 111] while femininity, based on the domestic and caring feminine role, may connect with entering the lotteries or refraining from gambling.[112, 113] Women with gambling problems are more likely than men to be characterized as "escape gamblers", using gambling as a negative way of coping with stress and troubles in their everyday lives.[114, 115]

Generally, women gamble on games of chance, such as bingo and lotteries, while men tend to take part in sports betting and other games where skill is assumed to be an advantage.[8, 104, 116, 117] Besides the gender specific preferences for gambling forms, the gambling location and social setting matter.[118] Women's participation increases if the facilities are clean, attractive, and patrons are treated with respect and feel physically safe,[108] as well as if the gambling takes place in public or more domestic environments.[119]

The *feminization* of gambling refers to the idea that more women are gambling, developing problems, and seeking help for problem gambling than in the past.[120] However, so far there is little evidence of this even though in some countries women gamble more frequently in general, and in particular, on types of games such as EGMs, online slots, and bingo.[100, 108, 121, 122] Due to the rapidly changing nature of online gambling there is a need to keep gender issues relating to online gambling updated.[14, 123]

Men are more likely to be problem gamblers than women. Being male had a strong relationship to harmful gambling in the 2012 report on worldwide studies of gambling and harmful gambling[10] as well as a more recent systematic review article.[124] There is no research evidence so far showing that problem gamblers who are women outnumber those who are men.[10, 124] The ratio of male to female problem gamblers averages two men to every one woman, although it varies by jurisdiction.[125] This is consistent with findings in a systematic review that included 44 studies on adolescent problem gambling.[126]

The gender difference in problem gambling rates seems largely due to differences in patterns of gambling behaviour.[117, 119, 125, 127, 128] The type and number of games played are central factors that influence the gender ratio of problem gambling. Interestingly, the

development of gambling problems seems still more or less equal for men and women who participate in the same types of games, or after looking more closely at how often people gamble and other risk factors.[125, 128] Even though indicators of problem gambling often are similar between men and women within game types, a few key exceptions have been found in behaviour among problem gamblers playing EGM and casino games in gambling venues. Indicators of emotional distress were more common among women with gambling problems, whereas their male counterparts were more likely to show aggressive behavior towards gambling devices and others in the venue.[101]

Research that looks at men and women separately shows that there are other differences.[129] Gendered social life and life circumstances intersect with gambling harms, as illustrated by the findings from the Canadian Community Health Survey.[130] Gendered expectations surrounding work and family roles provided additional protection from problem gambling for men who were married and employed, but they did not provide the same benefits for women; being married and employed was associated with *more* gambling-related problems for women. Some clinical studies show that women more often experience a *telescoping effect,* where they generally begin to gamble harmfully later in life than men, but when problems start they progress more rapidly.[104] On the other hand, in general population studies, the telescoping effect is not evident when compared to male gamblers.[131]

Studies that do not look at men and women separately often note that being male is a risk factor.[132, 133] It could be thought that gender is less a predictor than a proxy for other risk factors such as violent behaviour, illicit drug use, risk-taking, and social anxiety.[106, 134] Although gender is linked to gambling patterns, it may be that more direct risk factors associated with gender are more important than gender itself in understanding harmful gambling, and perhaps more enduring over time.[132]

REFERENCES

1. GAMECS Project. Gambling among members of ethnic communities in Sydney: Report on problem gambling and ethnic communities. Part 1. Sydney, Australia: Ethnic Communities Council of NSW; 1999.

2. Lin E-YJ, Casswell S, Huckle T, You RQ, Asiasiga L. Does one shoe fit all? Impacts of gambling among four ethnic groups in New Zealand. Journal of Gambling Issues [Internet]. 2011; (26)69-88 pp.]. Available from: https://doi.org/10.4309/jgi.2011.26.6.

3. Loo JM, Raylu N, Oei TP. Gambling among the Chinese: A comprehensive review. *Clinical Psychology Review*. 2008;28(7):1152-66.

4. Matilainen R. Cultural and social meanings of gambling in Finland and Sweden. In: Zollinger M, editor. *Random riches: Gambling past and present*. New York, NY: Routledge; 2016. p. 119-31.

5. Parish J. Witchcraft, riches and roulette: An ethnography of West African gambling in the UK. *Ethnography*. 2005;6(1):105-22.

6. Raylu N, Oei TP. Role of culture in gambling and problem gambling. *Clinical Psychology Review*. 2004;23(8):1087-114.

7. Scull S, Woolcock G. Problem gambling in non-English speaking background communities in Queensland, Australia: A qualitative exploration. *International Gambling Studies*. 2005;5(1):29-44.

8. Tepperman L, Korn D. At home with gambling: An exploratory study. Guelph, ON: Gambling Research Exchange Ontario; 2002. Available from: http://www.greo.ca/Modules/EvidenceCentre/files/Tepperman%20et%20al%282001%29At_home_with_gambling.pdf.

9. Wynne H, McCready J. Addressing problem gambling in Toronto and Windsor/Essex County ethnic communities: Final summary report. Toronto, ON: COSTI Immigrant Services; 2004. Available from: http://www.costi.org/downloads/finalreport_2.pdf.

10. Williams RJ, Volberg R, Stevens RMG. The population prevalence of problem gambling: methodological influences, standardized rates, jurisdictional differences, and worldwide trends. Guelph, ON: Gambling Research Exchange Ontario; 2012. Available from: http://www.greo.ca/Modules/EvidenceCentre/Details/population-prevalence-problem-gambling-methodological-influences-standardized-rates-0.

11. Forrest D, Wardle H. Gambling in Asian communities in Great Britain. *Asian Journal of Gambling Issues and Public Health*. 2011;2(1):2-16.

12. Kim W. Acculturation and gambling in Asian Americans: When culture meets availability. *International Gambling Studies*. 2012;12(1):69-88.

13. Clarke D, Clarkson J. A preliminary investigation into motivational factors associated with older adults' problem gambling. *International Journal of Mental Health and Addiction*. 2007;7(1):12-28.

14. Corney R, Davis J. The attractions and risks of Internet gambling for women: A qualitative study. Journal of Gambling Issues [Internet]. 2010; (24)121-39 pp.]. Available from: https://doi.org/10.4309/jgi.2010.24.8.

15. Binde P. Exploring the impact of gambling advertising: An interview study of problem gamblers. *International Journal of Mental Health and Addiction*. 2009;7(4):541-54.

16. Casey E. Gambling and consumption: Working-class women and UK national lottery play. *Journal of Consumer Culture*. 2003;3(2):245-63.

17. Fisher S. The pull of the fruit machine: A sociological typology of young players. *The Sociological Review*. 1993;41(3):446-74.

18. Malaby TM. *Gambling life: Dealing in contingency in a Greek city*. Urbana, IL: University of Illinois Press; 2003.

19. McMillen J. *Gambling cultures: Studies in history and interpretation*. London, UK: Routledge; 1996.

20. Neal M. 'You lucky punters!' A study of gambling in betting shops. *Sociology*. 1998;32(3):581-600.

21. Abbott MW, Volberg RA. *Taking the pulse on gambling and problem gambling in New Zealand: A report on phase one of the 1999 national prevalence survey*. Auckland, New Zealand: Department of Internal Affairs Wellington; 2000.

22. Volberg RA, Wray M. Legal gambling and problem gambling as mechanisms of social domination? Some considerations for future research. *American Behavioral Scientist*. 2007;51(1):56-85.

23. Lau L-Y, Ranyard R. Chinese and English probabilistic thinking and risk taking in gambling. *Journal of Cross-Cultural Psychology*. 2005;36(5):621-7.

24. Jacoby N, von Lersner U, Schubert HJ, Loeffler G, Heinz A, Mörsen CP. The role of acculturative stress and cultural backgrounds in migrants with pathological gambling. *International Gambling Studies*. 2013;13(2):240-54.

25. Dickins M, Thomas A. *Gambling in culturally and linguistically diverse communities in Australia*. Melbourne, Australia: Australian Gambling Research Centre; 2016.

26. Breen H, Gainsbury S. Aboriginal gambling and problem gambling: A review. *International Journal of Mental Health and Addiction*. 2013;11(1):75-96.

27. Volberg RA, Abbott MW. Gambling and problem gambling among Indigenous peoples. *Substance Use and Misuse*. 1997;32(11):1525-38.

28. UNDESA Division for Inclusive Social Development Indigenous Peoples. Indigenous Peoples at the UN. New York, NY: United Nations; No date [cited 2018 Sep 21]. Available from: https://www.un.org/development/desa/indigenouspeoples/about-us.html.

29. Abbott M, Volberg R, Bellringer M, Reith G. A review of research on aspects of problem gambling. London, UK: Responsibility in Gambling Trust; 2004.

30. Barnes GM, Welte JW, Tidwell MO. Gambling involvement among Native Americans, Blacks, and Whites in the United States. *American Journal on Addictions*. 2017.

31. Dyall L. Gambling: A poison chalice for indigenous peoples. *International Journal of Mental Health and Addiction*. 2010;8:205–13.

32. Kong G, Smith PH, Pilver C, Hoff R, Potenza MN. Problem-gambling severity and psychiatric disorders among American-Indian/Alaska native adults. *Journal of Psychiatric Research*. 2016;74:55-62.

33. Wardman D, el-Guebaly N, Hodgins D. Problem and pathological gambling in North American Aboriginal populations: A review of the empirical literature. *Journal of Gambling Studies*. 2001;17(2):81-100.

34. United Nations Declaration on the Rights of Indigenous Peoples. United Nations; 2008. Available from: http://www.un.org/esa/socdev/unpfii/documents/DRIPS_en.pdf.

35. Gabriel K. *Gambler way: Indian gaming in mythology, history and archaeology in North America*. Boulder, CO: Johnson Books; 1996.

36. Thwaites RG, editor. The Jesuit relations and allied documents. Cleveland, OH: The Burrows Brothers. (Original work published 1636); 1897.

37. Jenness D. *Indians of Canada*. Ottawa, ON: Information Canada; 1972.

38. Naokwegijig-Corbiere MA, Valentine R. Nishnaabemwin: Odawa and Eastern Ojibwe online dictionary 2018 [cited 2018]. Available from: https://dictionary.nishnaabemwin.atlas-ling.ca/#/help.

39. Williams RJ, Stevens RMG, Nixon G. Gambling and problem gambling in North American Aboriginal peoples. In: Belanger YD, editor. *First Nations gaming in Canada*. Winnipeg, MB: University of Manitoba Press; 2011. p. 166-94.

40. Breen H, Hing N, Gordon A, Buultjens J. Meanings of Aboriginal gambling across New South Wales, Australia. *International Gambling Studies*. 2012;12(2):243-56.

41. Hing N, Breen H, Gordon A, Russell A. Gambling behaviour and gambling risk factors for Indigenous Australian women. *International Journal of Mental Health and Addiction*. 2013;12(1):1-20.

42. Hing N, Breen H, Gordon A, Russell A. The gambling behavior of Indigenous Australians. *Journal of Gambling Studies*. 2014;30(2):369-86.

43. Dyall L. Gambling, social disorganisation and deprivation. *International Journal of Mental Health and Addiction*. 2007;5(4):320-30.

44. Breen H. Visitors to northern Australia: Debating the history of Indigenous gambling. *International Gambling Studies*. 2008;8:137-50.

45. Binde P. Gambling across cultures: Mapping worldwide occurrence and learning from ethnographic comparison. *International Gambling Studies*. 2005;5(1):1-27.

46. Abbott M, Bellringer M, Garrett N, Mundy-McPherson S. *New Zealand 2012 National Gambling Study: Overview and gambling participation (Report number 1)*. Auckland, New Zealand: Auckland University of Technology, Gambling and Addictions Research Centre; 2014.

47. Abbott M, Bellringer M, Garrett N, Mundy-McPherson S. *New Zealand 2012 National Gambling Study: Gambling harm and problem gambling (Report number 2)*. Auckland, New Zealand: Auckland University of Technology, Gambling and Addictions Research Centre 2014.

48. McMillen J, Donnelly K. Gambling in Australian Indigenous communities: The state of play. *Australian Journal of Social Issues*. 2008;43(3):397-426.

49. Snodgrass JJ. Health of Indigenous circumpolar populations. *Annual Review of Anthropology*. 2013;42(1):69-87.

50. Walker SE, Abbott MW, Gray RJ. Knowledge, views and experiences of gambling and gambling-related harms in different ethnic and socio-economic groups in New Zealand. *Aust N Z J Public Health*. 2012;36(2):153-9.

51. Yanicki S, Gregory D, Lee B. Gambling behaviours among Aboriginal peoples: Indigenous and critical socio-ecological perspectives. In: Belanger YD, editor. *First Nations gambling in Canada*. Winnipeg, MB: University of Manitoba Press; 2011. p. 195-226.

52. Young M, Barnes T, Stevens M, Paterson M, Morris M. The changing landscape of Indigenous gambling in Northern Australia: Current knowledge and future directions. *International Gambling Studies*. 2007;7(3):327-43.

53. Zitzow D. Comparative study of problematic gambling behaviors between American Indian and non-Indian adults in a northern plains reservation. *American Indian and Alaska Native Mental Health Research*. 1996;7(2):27-41.

54. Abbott M, Volberg R. Gambling and problem gambling in New Zealand (Research Series No. 14). Wellington, New Zealand: Department of Internal Affairs; 1991.

55. Larsen CV, Curtis T, Bjerregaard P. Gambling behavior and problem gambling reflecting social transition and traumatic childhood events among Greenland Inuit: A cross-sectional study in a large Indigenous population undergoing rapid change. *Journal of Gambling Studies*. 2013;29(4):733-48.

56. Lorains FK, Cowlishaw S, Thomas SA. Prevalence of comorbid disorders in problem and pathological gambling: systematic review and meta-analysis of population surveys. *Addiction*. 2011;106(3):490-8.

57. Mason E. An ecological and life course analysis of binge drinking and problem gambling among Indigenous populations in Canada (Masters Thesis). Lethbridge, AB: University of Lethbridge,; 2017.

58. Patterson—Silver Wolf Adelv Unegv Waya DA, Welte JW, Barnes GM, Tidwell MC, Spicer P. Sociocultural influences on gambling and alcohol use among Native Americans in the United States. *Journal of Gambling Studies*. 2015;31(4):1387-404. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/native-american-culture-may-be-risk-factor-problem-gambling

59. Riley BJ, Larsen A, Battersby M, Harvey P. Problem gambling among Australian male prisoners: Lifetime prevalence, help-seeking, and association with incarceration and Aboriginality. *Int J Offender Ther Comp Criminol*. 2018;62(11):3447-59. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/lifetime-prevalence-of-problem-gambling-among-male-prisoners-in-australia

60. Manitowabi D. Casino Rama: First Nations self-determination, neoliberal solution or partial middle ground? In: Belanger YD, editor. *First Nations Gaming in Canada*. Winnipeg, MB: University of Manitoba Press; 2011. p. 255-78.

61. Belanger Y. *Journey to healing: Aboriginal people with addiction and mental health issues: What health, social service and justice workers need to know*. Toronto, ON: Centre for Addiction and Mental Health; 2014.

62. Moellman N, Mitra A. Indian gaming in Oklahoma: Implications for community welfare. *The Journal of Socio-Economics*. 2013;45:64–70.

63. Dixon D. *From prohibition to regulation: Bookmaking, anti-gambling, and the law*. Oxford, UK: Oxford University Press; 1991.

64. Husz O. Private dreams and public expectations: Lotteries and dilemmas of progress and social welfare in early 20th-century Sweden. *Journal of Consumer Culture*. 2002;2(1):53-79.

65. McKibbin R. Working-class gambling in Britain 1880–1939. *Past and Present*. 1979;82(1):147-78.

66. Binde P. Gambling motivation and involvement. Östersund, Sweden: Swedish National Institute of Public Health; 2009. Available from: https://www.folkhalsomyndigheten.se/contentassets/5e4ce18338a44e38af725c7492208495/r2009-20-gambling-motivation-a-review.pdf.

67. Barnhart RT. Gambling in revolutionary Paris - The Palais Royal: 1789-1838. *Journal of Gambling Studies*. 1992;8(2):151-66.

68. Rose IN. Gambling and the law: The new millennium. In: Reith G, editor. *Gambling: Who wins? Who loses?* Amherst, NY: Prometheus; 2003. p. 113-31.

69. Lund I. The population mean and the proportion of frequent gamblers: Is the theory of total consumption valid for gambling? *Journal of Gambling Studies*. 2008;24(2):247-56.

70. Zola IK. Observations on gambling in a lower-class setting. *Social Problems*. 1963;10(4):353-61.

71. Helfant IM. *The high stakes of identity: Gambling in the life and literature of nineteenth-century Russia*. Evanston, IL: Northwestern University Press; 2002.

72. Kavanagh TM. *Enlightenment and the shadows of chance: The novel and the culture of gambling in eighteenth-century France*. Baltimore, MD: Johns Hopkins University Press; 1993.

73. Binde P. Report from Sweden: The first state-owned internet poker site. *Gaming Law Review*. 2007;11(2):108-15.

74. Currie BB. *The gambler: Romancing lady luck. A Jungian exploration*. Toronto, ON: Inner City Books; 2007.

75. Kusyszyn I. The Psychology of Gambling. *The ANNALS of the American Academy of Political and Social Science*. 2016;474(1):133-45.

76. Wong Y-LR, Leung YKT, Lau CWD. Behind the allure of gambling: A qualitative exploration of the existential yearnings of Chinese men with problem gambling in Hong Kong. *International Gambling Studies*. 2009;9(3):189-205.

77. Clark D, Tse S, Abbott M, Townsend S, Kingi P, Manaia W. Religion, spirituality and associations with problem gambling. *New Zealand Journal of Psychology*. 2006;35(2):77-83.

78. Ferentzy P, Skinner W, Antze P. The serenity prayer: Secularism and spirituality in Gamblers Anonymous. *Journal of Groups in Addiction and Recovery*. 2010;5(2):124-44.

79. Hagen B, Kalishuk RG, Currie C, Solowoniuk J, Nixon G. A big hole with the wind blowing through it: Aboriginal women's experiences of trauma and problem gambling. *International Gambling Studies*. 2013;13(3):356-70.

80. Nixon G, Solowoniuk J, McGowan V. The counterfeit hero's journey of the pathological gambler: A phenomenological hermeneutics investigation. *International Journal of Mental Health and Addiction*. 2006;4(3):217-32.

81. Casey DM, Williams RJ, Mossiere AM, Schopflocher DP, el-Guebaly N, Hodgins DC, et al. The role of family, religiosity, and behavior in adolescent gambling. *Journal of Adolescence*. 2011;34(5):841-51.

82. Eitle D. Religion and gambling among young adults in the United States: Moral communities and the deterrence hypothesis. *Journal for the Scientific Study of Religion*. 2011;50(1):61-81.

83. Ghandour LA, El Sayed DS. Gambling behaviors among university youth: Does one's religious affiliation and level of religiosity play a role? *Psychology of Addictive Behaviors*. 2013;27(1):279. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/gambling-behaviors-among-university-youth-does-ones-religious-affiliation-and-level-of-religiosity

84. Hayatbakhsh R, Najman J, Aird R, Bor W, O'Callaghan M, Williams G, et al. Early life course determinants of young adults' gambling behaviour. An Australian longitudinal study. Brisbane, Australia: School of Population Health, Social Science, and Medicine, The University of Queensland; 2006. Available from: https://espace.library.uq.edu.au/view/UQ:84649.

85. Campbell C. Half-belief and the paradox of ritual instrumental activism: A theory of modern superstition. *British Journal of Sociology*. 1996;47(1):151-66.

86. Henslin JM. Craps and Magic. *American Journal of Sociology*. 1967;73(3):316-30.

87. Teed M, Finlay KA, Marmurek HH, Colwell SR, Newby-Clark IR. Sympathetic magic and gambling: Adherence to the law of contagion varies with gambling severity. *Journal of Gambling Studies*. 2012;28(4):691-701.

88. D'Agati M. "I feel like I'm going to win": Superstition in gambling. *Qualitative Sociology Review*. 2014;10(2):80-101.

89. Kim J, Ahlgren MB, Byun J-W, Malek K. Gambling motivations and superstitious beliefs: A cross-cultural study with casino customers. *International Gambling Studies*. 2016;16(2):296-315.

90. Fox K. *The racing tribe: Watching the horsewatchers*. London, UK: Metro Publishing; 2005.

91. Hayano DM. *Poker faces: The life and work of professional card players*. Berkeley, CA: University of California Press; 1982.

92. Krauss F. *Taking the points: The socialization process of a sports book "regular"*. Las Vegas, NV: Center for Gambling Research, University of Nevada; 2010.

93. Puri SS. Speculation in fixed futures: An ethnography of betting in between legal and illegal economies at the Delhi racecourse. Copenhagen, Denmark: University of Copenhagen; 2014.

94. Rosecrance J. Why regular gamblers don't quit. *Sociological Perspectives*. 1986;29(3):357-78.

95. Rosecrance J. *The degenerates of Lake Tahoe: A study of persistence in the social world of horse race gambling*. New York, NY: Peter Lang Publishing; 1985.

96. Dixey R, Talbot M. *Women, leisure and bingo*. London, UK: Trinity and All Saints' College; 1982.

97. O'Leary K, Carroll C. The online poker sub-culture: Dialogues, interactions and networks. *Journal of Gambling Studies*. 2013;29(4):613-30.

98. Ocean G, Smith GJ. Social reward, conflict, and commitment: A theoretical model of gambling behavior. *Journal of Gambling Studies*. 1993;9(4):321-39.

99. Abbott MW, Volberg RA, Ronnberg S. Comparing the New Zealand and Swedish national surveys of gambling and problem gambling. *Journal of Gambling Studies*. 2004;20(3):237-58.

100. Svensson J. Gambling and gender: A public health perspective [doctoral dissertation]. Östersund, Sweden: Mid Sweden University; 2013. Available from: http://www.diva-portal.org/smash/record.jsf?searchId=1andpid=diva2%3A625208anddswid=8654.

101. Delfabbro P, Thomas A, Armstrong A. Gender differences in the presentation of observable risk indicators of problem gambling. *Journal of Gambling Studies*. 2018;34(1):119-32.

102. Diez D, Aragay N, Soms M, Prat G, Casas M. Male and female pathological gamblers: Bet in a different way and show different mental disorders. *Spanish Journal of Psychology*. 2014;17:101.

103. Hing N, Russell A, Tolchard B, Nower L. *A comparative study of men and women gamblers in Victoria*. Victoria, Australia: Victorian Responsible Gambling Foundation; 2014.

104. Merkouris SS, Thomas AC, Shandley KA, Rodda SN, Oldenhof E, Dowling NA. An update on gender differences in the characteristics associated with problem gambling: A systematic review. *Current Addiction Reports*. 2016;3(3):254-67.

105. Public Health Agency of Sweden. Gambling and gambling problems in Sweden 2008-2010. Swedish longitudinal gambling study. Swelogs findings from wave one and wave two. Östersund, Sweden: Public Health Agency of Sweden; 2016.Report No.: 16013.

106. Wong G, Zane N, Saw A, Chan AK. Examining gender differences for gambling engagement and gambling problems among emerging adults. *Journal of Gambling Studies*. 2013;29(2):171-89.

107. Molinaro S, Benedetti E, Scalese M, Bastiani L, Fortunato L, Cerrai S, et al. Prevalence of youth gambling and potential influence of substance use and other risk factors across 33 European countries: First results from the 2015 ESPAD study. *Addiction*. 2018.

108. Holdsworth L, Hing N, Breen H. Exploring women's problem gambling: A review of the literature. *International Gambling Studies*. 2012;12(2):199-213.

109. Miller DL. Symbolic capital and gender: Evidence from two cultural fields. *Cultural Sociology*. 2014;8(4):462-82.

110. Cassidy R. 'A place for men to come and do their thing': Constructing masculinities in betting shops in London. *British Journal of Sociology*. 2014;65(1):170-91.

111. Hunt CJ, Gonsalkorale K. Conformity to masculine norms among treatment-seeking male problem gamblers. *International Gambling Studies*. 2018:1-12.

112. Casey E. Domesticating gambling: Gender, caring and the UK national lottery. *Leisure Studies*. 2006;25(1):3-16.

113. Casey E. *Women, pleasure and the gambling experience*. Farhnham, UK: Hampshire Ashgate Publishing Limited; 2012.

114. Boughton R. Voices of women who gamble in Ontario: A survey of women's gambling, barriers to treatment and treatment service needs. Niagara Falls, ON: Responsible Gambling Council; 2002.

115. Dow Schull N. *Escape mechanism: Women, caretaking, and compulsive machine gambling. Working Paper No. 41*. Berkeley, CA: University of California, Berkeley; 2002.

116. Gausset Q, Jansbøl K. "Tell me what you play and I will tell you who you are": Values and gambling habits in two Danish universities. *International Gambling Studies*. 2009;9(1):67-78.

117. Stark S, Zahlan N, Albanese P, Tepperman L. Beyond description: Understanding gender differences in problem gambling. *Journal of Behavioral Addictions*. 2012;1(3):123-34.

118. Kairouz S, Paradis C, Monson E. Gender, gambling settings and gambling behaviours among undergraduate poker players. *International Gambling Studies*. 2016;16(1):85-97.

119. Svensson J, Romild U. Regular male and female gamblers in a population based study: Analyzing PGSI-items in gendered gambling domains. *Sex Roles*. 2014;70:240-54.

120. Volberg RA. Has there been a feminization of gambling and problem gambling in the United States? *Journal of Gambling Issues*. 2003;8.

121. Dowling N, Oldenhof E. Gender differences in risk and protective factors for problem gambling. In: Bowden-Jones H, Prever F, editors. *Gambling disorders in women: An international female perspective on treatment and research*. New York City, NY: Routledge; 2017. p. 247.

122. Potenza MN, Maciejewski PK, Mazure CM. A gender-based examination of past-year recreational gamblers. *Journal of Gambling Studies*. 2006;22(1):41-64.

123. Nordmyr J, Forsman AK, Wahlbeck K, Björkqvist K, Österman K. Associations between problem gambling, socio-demographics, mental health factors and gambling type: sex differences among Finnish gamblers. *International Gambling Studies*. 2013;14(1):39-52.

124. Calado F, Griffiths MD. Problem gambling worldwide: An update and systematic review of empirical research (2000-2015). *Journal of Behavioral Addictions*. 2016;5(4):592-613.

125. Blanco C, Hanania J, Petry NM, Wall MM, Wang S, Jin CJ, et al. Towards a comprehensive developmental model of pathological gambling. *Addiction*. 2015;110(8):1340-51.

126. Calado F, Alexandre J, Griffiths MD. Prevalence of adolescent problem gambling: A systematic review of recent research. *Journal of Gambling Studies*. 2017;33(2):397-424.

127. LaPlante DA, Nelson SE, LaBrie RA, Shaffer HJ. Men and women playing games: Gender and the gambling preferences of Iowa gambling treatment program participants. *Journal of Gambling Studies*. 2006;22(1):65-80.

128. Romild U, Svensson J, Volberg R. A gender perspective on gambling clusters in Sweden using longitudinal data. *Nordic Studies on Alcohol and Drugs*. 2017;33(1):43-60.

129. Fröberg F, Modin B, Rosendahl IK, Tengström A, Hallqvist J. The association between compulsory school achievement and problem gambling among Swedish young people. *Journal of Adolescent Health*. 2015;56(4):420-8. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/are-swedish-students-poor-grades-more-likely-have-gambling-problems

130. Hing N, Russell A, Tolchard B, Nower L. Risk factors for gambling problems: An analysis by gender. *Journal of Gambling Studies*. 2016;32(2):511-34.

131. Slutske WS, Blaszczynski A, Martin NG. Sex differences in the rates of recovery, treatment-seeking, and natural recovery in pathological gambling: Results from an Australian community-based twin survey. *Twin Research and Human Genetics*. 2009;12(5):425-32.

132. Dowling NA, Merkouris SS, Greenwood CJ, Oldenhof E, Toumbourou JW, Youssef GJ. Early risk and protective factors for problem gambling: A systematic review and meta-analysis of longitudinal studies. *Clinical Psychology Review*. 2017;51:109-24.

133. Johansson A, Grant JE, Kim SW, Odlaug BL, Gotestam KG. Risk factors for problematic gambling: A critical literature review. *Journal of Gambling Studies*. 2009;25(1):67-92.

134. Nelson SE, Laplante DA, Labrie RA, Shaffer HJ. The proxy effect: Gender and gambling problem trajectories of Iowa gambling treatment program participants. *Journal of Gambling Studies*. 2006;22(2):221-40.

3.2 SOCIAL FACTORS

Social factors encompass both interactions among people and their collective co-existence. All spheres of human activity are shaped by interactions between the social patterns or organizations of a given society (*social structure*), and a person's ability to freely choose his or her actions or beliefs (*individual agency*). Social factors span interpersonal relationships at the *micro* level of social relationships; environmental and cultural factors are relevant at the *macro* level of social structures and institutions. Social factors are important in shaping how commercial gambling is made available in different societies, and how people who develop difficulties with their gambling are viewed and treated by others. Social factors also influence attitudes and beliefs about different types of gambling, as well as about harmful gambling and the best ways to prevent or reduce harm.

The interpersonal aspects of social factors encompass the relatively stable relationships that people form with each other in social contexts such as a family, peer group, workplace, or neighbourhood. In such contexts, people are aware of and affected by each other's actions. Over time, relatively stable patterns of interaction evolve, and are perceived by those involved to be guided by explicit norms and values. Social and interpersonal relationships have an ongoing influence on people of all ages, but are particularly important in the socialization of children and youth.

Some features of social and interpersonal relations can constitute risk factors for harmful gambling. Close relationships with others who gamble regularly can lead people to gamble more. These close ties can also interfere with a person's efforts to reduce or end gambling activity. Conversely, close relationships with others who gamble very little can positively influence people and protect them from developing gambling-related problems. However, for people who enjoy gambling, close relationships with others who gamble very little can be a source of conflict and stress.

An important feature of social interactions is that they take place in particular historical moments and add up over time. The accumulation of stressful life events may lead people to gamble more and to experience gambling harm.[1-4] People of different ages also experience historical events differently, and these events can have different effects on gambling and, potentially, gambling harm. This is addressed in Section 5: Longitudinal Cohort Studies.

Humans are social beings, but maintaining interpersonal relationships requires mental and emotional energy. Gambling often takes place in the company of others, but social interaction in these settings may be quite restricted and formalized. For example, slot machine and bingo players who sit next to each other while playing might only occasionally interact. If players do converse with one another, it is typically only in relation to the game, rather than in more wide-ranging social discussion.

This kind of limited interpersonal contact is appreciated by people who would like to have some company, but do not want to engage intellectually or emotionally with other players. They may already have problems handling interpersonal relations in the family, with friends, or in the workplace; gambling is a form of escape where people can avoid such interactions. Alternatively, other people may long for genuine interpersonal closeness but lack the social skills to achieve it. This may create a "…vulnerability to seeking solace in addictive quasi-social behaviours such as gambling".[5, para4]

In this section, we will focus on social factors: social demographics, family and peer gambling involvement, education systems, neighbourhood, stigmatization, and deviance. Generally speaking, evidence for the links between social factors and levels of harmful gambling is not strong. The strongest evidence relates to social demographics and the role of family and peers in influencing gambling involvement. Evidence related to the role of the education system, as well as to neighbourhoods, stigmatization, and deviance is much less robust.

3.2.1 SOCIAL DEMOGRAPHICS

In numerous studies, harmful gambling has been associated with male gender, under 30 years of age, low income, and single marital status. Low occupational status, lower levels of formal education, and non-Caucasian ethnicity are additional risk factors, as is living in large cities.[6]

Some studies have found that harmful gambling is associated with certain occupations. For example, Scandinavian studies have found elevated problem and at-risk gambling rates among taxi and bus drivers, who have flexible hours, time on their hands between jobs, little physical supervision, and easy access to gambling in cafés and betting shops.[7, 8] A Norwegian study found that people who frequently travelled for business or in connection with work (more than 100 days a year) had higher rates of problem gambling than those who travelled less.[9] More generally, at-risk and problem gambling are more prevalent among blue collar occupations than among academic professions.[7, 10]

While job stress has been proposed as a possible contributor to the development of harmful gambling,[11] little is known about this relationship. Similarly, little is known about the relationship between harmful gambling and unemployment. This is also true of the relationship between harmful gambling and wealth, since most studies only investigate annual household income and do not examine the full spectrum of people's assets in relation to their gambling involvement.

One area that has received recent research interest is the relationship between gambling, other addictive behaviours, and homelessness. Studies in this area are generally small but have been conducted in several countries, including Australia, Canada, and England.[12-16] These studies highlight the complex needs of people experiencing gambling problems and homelessness. They also point to the long-lasting effects of housing insecurity on gambling involvement and on other addictive behaviors.

3.2.2 FAMILY AND PEER GAMBLING INVOLVEMENT

Peers and family members are important influences, particularly on the gambling behaviours of teenagers and young adults. In contrast to most other adolescent risk behaviours, parents, siblings and other family members often approve of and are involved with children and adolescents in informal gambling. There is extensive research linking parental and adolescent gambling. Parental gambling is associated with higher rates of gambling participation and higher rates of gambling problems among adolescents. Involvement with antisocial peers who may model and reinforce risky gambling may also contribute to youth gambling problems.[17]

Families play a role in contributing to or preventing the development of harmful gambling through exposure to gambling activities and through social learning. In many studies, people with gambling problems report high levels of gambling and harmful gambling among members of their families. Several recent studies have documented links between adverse childhood experiences and early family dysfunction, and the cumulative impact of these experiences on problem gambling later in life.[18-20]

Parenting style is another feature of upbringing related to developing gambling problems. Authoritative parenting generally directs teens away from harmful gambling pathways. As with youth risk behaviours more generally, parental monitoring (engagement) has been identified as an effective protective factor in relation to the development of harmful gambling among youth.[21]

Along with the gambling setting, the people one gambles with can have an impact on the extent of potentially addictive gambling behaviour. Some people have 'gambling friends', who are friends only because gambling is a common interest. A significant disruption in their non-gambling social lives, such as a divorce, loss of a job, or the death of a loved one, can leave only their 'gambling friends' as a support system. Interacting with this group almost exclusively, in turn, increases the intensity of their gambling.[22]

Gambling alone is commonly seen as a risk factor for harmful gambling and is associated with high stakes betting.[23] Although gambling alone is a risk factor, the presence and actions of other gamblers can also facilitate gambling.[24, 25] For instance, playing with others who gamble for long periods of time and for high stakes, may lead a person to play over his or her limits.[25] There may be risks in both social and solitary situations; early gambling behaviour is associated with social contexts, whereas problem gambling can serve as a coping strategy and be used to enhance positive emotional states.[26]

Most people with a gambling problem do not seek professional help.[27] Therefore, the help provided to gamblers through their support systems—such as family members and friends—may be of great value.[28] The ways in which families cope with a member who has a gambling problem can vary. Their attitudes and approaches can either facilitate entering treatment or actually create barriers to seeking treatment. Relationships with others who have gambling problems in a mutual support society may contribute to the resolution of harmful gambling.[29] The person gets support to abstain from gambling, finds new non-gambling friends, and feels valuable and needed when helping others with a gambling problem.

An emerging area of research is focused on intimate partners of people with gambling problems. Problem gambling is linked to increased odds of dating violence, marital violence, and child abuse.[30] A systematic review and meta-analysis of the association between problem gambling and intimate partner violence found 14 studies that document a significant relationship

between problem gambling and being a victim of intimate partner violence. The relationship appears to be influenced by younger age, less than full employment, clinical anger issues, and alcohol and substance use.[31]

3.2.3 EDUCATION SYSTEM

There is good evidence that teenagers and young adults often participate in informal gambling, and transition to commercial forms of gambling as they reach legal age. This makes the education system an important institution for informing young people about the benefits and risks of gambling. Education is also important for fostering appropriate gambling-related knowledge and beliefs,[32] although awareness of the extent of youth gambling problems among teachers and administrators appears low.[33]

A limited amount of research has focused on describing students' knowledge and beliefs about gambling,[34] and evaluating curricula aimed at changing beliefs and behaviours as well as preventing problems.[35, 36] Programs that target either the whole student body or specific subgroups have both been developed, and curricula have included teaching both information (e.g., knowledge of odds) and skills (e.g., coping, problem-solving), and using lecture and video formats (see reviews by Keen, Blaszczynski and Anjoul;[37] Ladouceur, Goulet, and Vitaro;[38] and, Williams et al.[39]).

Evaluation studies have generally focused on youth aged 12 to 18 years and have evaluated changes immediately after the education program.[38] The only study with a longer-term follow-up (i.e., 12 months) reported that the immediate gains post-intervention were generally maintained.[40] There is no data on whether these programs reduced the incidence of new cases of gambling problems.[39]

The goal of such research is to develop effective programs that can be implemented widely. However, dissemination will likely be a challenge as educators and educational institutions do not always view gambling as an important concern.[41-43] In practical terms, this means that they are often reluctant to adopt measures to prevent and/or mitigate harm associated with adolescent gambling.

3.2.4 NEIGHBOURHOOD

Increases in the availability of gambling are widely assumed to lead to increases in the prevalence of harmful gambling. Researchers have investigated this relationship and report somewhat conflicting results (see Section 2.2 Gambling Exposure). At the neighbourhood level, there is some evidence that easy access to gambling opportunities is associated with higher rates of gambling participation and gambling-related problems, although the causal direction of these links has not been established.[44-47] It is likely that this relationship is true for some groups in the population but not for others. It is also clear that gambling opportunities are not randomly distributed across neighbourhoods.[45, 48-52]

There is evidence that the location of gambling venues is influenced by levels of *social capital* in different communities, although the reasons for this are unclear.[53] Social capital refers to networks of connection that exist between people and their shared norms and values, which work together to encourage positive

social cooperation. Neighbourhoods with high social capital are characterized by complex social networks that support high levels of trust and confidence among residents. Neighbourhoods with low social capital are characterized by high levels of distrust among residents, as well as low levels of trust in social institutions and low levels of civic participation.[54]

Gambling outlets are more likely to be located in areas with lower socioeconomic status,[44, 55, 56] which generally have less social capital.[54] There is a significant connection between increased gambling availability and higher levels of gambling problems within the community.[50, 57] One hypothesis that needs to be examined further is that gambling operators often find it easier to locate venues in neighbourhoods with low social capital because these communities are less likely to mobilize to prevent their introduction. Still, in some countries, like Sweden, the machines are located at pubs because a permit to sell alcohol is needed and the majority of pubs are located in areas with low SES.

In the United States, research with adolescents found that males living in neighbourhoods with lower social control were more likely to gamble than those who live in areas with higher social control;[58] and neighbourhoods with generally lower socioeconomic status are associated with more gambling and problem gambling.[48, 59, 60]

In Australia, Marshall and colleagues have noted that areas with lower socioeconomic status in many large cities have experienced the greatest allocations of electronic gaming machines (EGMs).[61-63] They argue that, unlike other public health issues, gambling-related problems are determined almost entirely by the local circumstances of the communities in which the gambling activity occurs. As a result, preventive strategies should target the local contextual environment, rather than just focus on gamblers. The geography of EGM gambling in Australia is the topic of two studies by Young, Markham and Doran,[64, 65] that investigate the distribution of EGMs in different types of venues and neighborhoods, as well as the distance travelled to EGM venues in relation to problem gambling.

Finally, in the United States, Welte and colleagues found that neighbourhood disadvantage was positively related to how often people living there gamble, and to the prevalence of problem and pathological gambling.[45] The researchers argued that the ecology of disadvantaged neighbourhoods and the availability of gambling opportunities promote both gambling participation and pathology. In Australia, Livingstone cites evidence that poker machines are strongly marketed and located close to disadvantaged areas.[66]

3.2.5 STIGMATIZATION

Stigmatization is the experience of having a characteristic that is viewed as shameful or discrediting and, as a result, being avoided or shunned. Stigmatization is a powerful tool of social control that can be used to marginalize, exclude, and exercise power over people. A systematic review of the literature on stigma in gambling was published by Hing, Holdsworth, Tiyce, and Breen.[67]

Although the overall amount of research specific to gambling stigma is limited, it is growing. Harmful gambling has been found to be more stigmatizing than some other health conditions, but similar to alcohol disorder and schizophrenia—although this may be influenced by context or by the social characteristics of observers.[68] Members of specific cultural groups may be relatively more stigmatized than others[69, 70] and women may be more stigmatized than men.[13, 71]

Stereotypes of gamblers and problem gamblers are similar and include adjectives such as compulsive, impulsive, desperate, irresponsible, risk-taking, depressed, greedy, irrational, antisocial, and aggressive.[72] At the same time, the general population in Western societies tends to medicalize gambling problems as an addiction, rather than seeing it as being related to poor character.[73]

Stigma, in the form of shame or embarrassment about one's over-involvement in gambling, is a significant obstacle to seeking help for a gambling problem. This has been identified across a number of studies in a variety of countries.[74-77] Fear of discrimination may also discourage people from disclosing their gambling struggles when seeking help for other social problems such as homelessness.[14, 78] To date, no research has investigated stigma reduction strategies in the problem gambling area.[67]

3.2.6 DEVIANCE

When activities and people are perceived as deviant or immoral, they sometimes come to be seen as 'sick' and hence under the domain of medical science and treatment. This 'medicalization' of deviance characterized gambling and harmful gambling in the 1970s and 1980s,[79, 80] and still continues to the current time. Research continues to explore links between biology and harmful gambling (see Section 3.4 Biological Factors) and people are increasingly expected to govern themselves in an era when external forms of social regulation have declined.[81]

While research on gambling as deviance (that views gambling as criminal or marginal) is relatively scarce, studies have found relationships between high rates of gambling and substance use among male adolescents, and also between impulsivity and friends' delinquency. Some researchers have concluded that a general problem behavioural syndrome underlies many deviant behaviours, including gambling. Some gambling activities, particularly informal gambling among friends, tend to be associated with higher rates of deviant behaviour,[82] while other gambling activities do not have such associations.

Prison populations typically have very high rates of problem gambling.[83] There seem to be two reasons for this, which in real life sometimes interact: first, problem gambling is an expression of a criminal lifestyle or factors selecting for criminal behavior generally; second, problem gambling has caused the person to commit crimes.

In the first case, harmful gambling is typically associated with substance-related and psychiatric comorbidity. For example, a Swedish study of male violent offenders found high rates of pathological gambling and psychiatric comorbidities with an early onset.[84] In Denmark, problem gambling is associated not only with committing economic crimes, but also with violent charges and drug charges.[85]

Research conducted with over 300 male and nearly 100 female prisoners in New Zealand found that about a quarter of male and a third of female prisoners from a nationally representative sample, serving the first year of their sentence, had gambling problems immediately prior to imprisonment. A relatively small number appear to have committed an offence as a consequence of a gambling problem. Most were involved in criminal activity first and happened to be both criminals and have a gambling problem.[86, 87]

In these cases, harmful gambling is driven by the same factors and circumstances that drive criminal behavior, such as impulsiveness, a sensation-seeking personality,

high risk taking, high levels of urgency, and increased lack of premeditation.[88] Social and environmental factors characterizing the criminal lifestyle also contribute to harmful gambling, such as conspicuous consumption when money is available, money laundering by means of gambling, a focus on quickly acquiring money, and a substantial amount of free time when in prison.

However, gambling problems may cause people without any criminal record to do unlawful things – this is called criminogenic problem gambling. The most common type is property crimes in order to procure money for gambling. This happens mostly in the final phase of escalating and excessive gambling, when money is desperately needed to pay bills, debts, and for continuing to gamble. The specific type of crimes committed depends on accidental circumstances, as well as on the social position and abilities of the person with gambling problems, for example: robbery, theft, forgery, fraud, and white-collar economic crimes.

In the case of gambling-related embezzlement in the workplace, there is an obvious link between harmful gambling and economic crime. The embezzler is typically a trusted employee who has been with the company or organization for a long time—which means that there are no significant prior psychiatric problems or a criminal record. The employee develops an addiction to gambling, starts to "borrow" money at the workplace, and sometimes ends up having embezzled huge sums.[89]

Criminogenic problem gambling may also result in other types of crimes, such as domestic violence in connection with arguments about excessive gambling[90] and violent behavior in gambling venues.[91]

REFERENCES

1. Luce C, Kairouz S, Nadeau L, Monson E. Life events and problem gambling severity: A prospective study of adult gamblers. *Psychology of Addictive Behaviors*. 2016;30(8):922-30. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/life-events-predict-problem-gambling-severity-over-time

2. Nuske EM, Holdsworth L, Breen H. Significant life events and social connectedness in Australian women's gambling experiences. *Nordic Studies on Alcohol and Drugs*. 2016;33(1):7-26.

3. Roberts A, Sharman S, Coid J, Murphy R, Bowden-Jones H, Cowlishaw S, et al. Gambling and negative life events in a nationally representative sample of UK men. *Addictive Behaviors*. 2017;75:95-102.

4. Okuda M, Liu W, Cisewski JA, Segura L, Storr CL, Martins SS. Gambling disorder and minority populations: Prevalence and risk factors. *Current Addiction Reports*. 2016;3(3):280-92.

5. Porter J, Ungar J, Frisch GR, Chopra R. Loneliness and life dissatisfaction in gamblers. Journal of Gambling Issues [Internet]. 2004; (11). Available from: https://doi.org/10.4309/jgi.2004.11.13.

6. Abbott M, Volberg R, Bellringer M, Reith G. A review of research on aspects of problem gambling. London, UK: Responsibility in Gambling Trust; 2004.

7. Binde P, Romild U. Self-reported negative influence of gambling advertising in a Swedish population-based sample. *Journal of Gambling Studies*. 2018.

8. Revheim T, Buvik K. Opportunity structure for gambling and problem gambling among employees in the transport industry. *International Journal of Mental Health and Addiction*. 2009;7(1):217-28.

9. Dahlgren K. Problematisk spilleatferd i arbeidslivet: Risikofaktorer, mulighetsstrukturer og AKAN-modellen [Problematic gambling behavior in working life: Risk factors, opportunity structures, and the AKAN model]. Oslo, Norway: AKAN; 2012. Available from: https://akan.no/wp-content/uploads/2013/09/pengespilldahlgren.pdf.

10. Orford J, Wardle H, Griffiths M, Sproston K, Erens B. The role of social factors in gambling: Evidence from the 2007 British Gambling Prevalence Survey. *Community, Work and Family*. 2010;13(3):257-71.

11. Wong ILK, Lam PS. Work stress and problem gambling among Chinese casino employees in Macau. Asian Journal of Gambling Issues and Public Health [Internet]. 2013 [cited 2013/03/12]; 3(1)7 p.]. Available from: https://ajgiph.springeropen.com/articles/10.1186/2195-3007-3-7.

12. Hamilton-Wright S, Woodhall-Melnik J, Guilcher SJT, Schuler A, Wendaferew A, Hwang SW, et al. Gambling in the landscape of adversity in youth: Reflections from men who live with poverty and homelessness. International Journal of Environmental Research and Public Health [Internet]. 2016; 13(9):Article 854 [17 p.]. Available from: https://doi.org/10.3390/ijerph13090854.

13. Holdsworth L, Hing N, Breen H. Exploring women's problem gambling: A review of the literature. *International Gambling Studies*. 2012;12(2):199-213.

14. Holdsworth L, Tiyce M. Untangling the complex needs of people experiencing gambling problems and homelessness. *International Journal of Mental Health and Addiction*. 2013;11(2):186-98.

15. Matheson FI, Devotta K, Wendaferew A, Pedersen C. Prevalence of gambling problems among the clients of a Toronto homeless shelter. *Journal of Gambling Studies*. 2014;30(2):537-46.

16. Sharman S, Dreyer J, Clark L, Bowden-Jones H. Down and out in London: Addictive behaviors in homelessness. *Journal of Behavioral Addictions*. 2016;5(2):318-24.

17. Hardoon KK, Gupta R, Derevensky JL. Psychosocial variables associated with adolescent gambling. *Psychology of Addictive Behaviors*. 2004;18(2):170-9.

18. Dowling NA, Merkouris SS, Greenwood CJ, Oldenhof E, Toumbourou JW, Youssef GJ. Early risk and protective factors for problem gambling: A systematic review and meta-analysis of longitudinal studies. *Clinical Psychology Review*. 2017;51:109-24.

19. Poole JC, Kim HS, Dobson KS, Hodgins DC. Adverse childhood experiences and disordered gambling: Assessing the mediating role of emotion dysregulation. *Journal of Gambling Studies*. 2017;33(4):1187-200.

20. Saugeres L, Thomas A, Moore S. 'It wasn't a very encouraging environment': influence of early family experiences on problem and at-risk gamblers in Victoria, Australia. *International Gambling Studies*. 2014;14(1):132-45.

21. Dane AV, Lawrance K, Derevensky JL, McPhee JL, Panetta L. Preventing youth problem gambling and high-risk behaviour: A longitudinal study of parenting as a protective factor. Guelph, ON: Gambling Research Exchange Ontario; 2008. Available from: http://www.greo.ca/Modules/EvidenceCentre/files/Dane%20et%20al%282008%29Preventing_youth_problem_gambling_and_high_risk_behaviour.pdf.

22. Rosecrance J. Why regular gamblers don't quit. *Sociological Perspectives*. 1986;29(3):357-78.

23. Bernhard BJ. Sociological speculations on treating problem gamblers: A clinical sociological imagination via a bio-psycho-social-sociological model. *American Behavioral Scientist*. 2007;51(1):122-38.

24. Mok Park H, Manchanda P. When Harry bet with Sally: An empirical analysis of multiple peer effects in casino gambling behavior. *Marketing Science*. 2015;34(2):179-94.

25. McDougall CL, Terrance C, Weatherly JN. The effect of male confederate presence, betting, and accuracy of play on males' gambling on blackjack. *The Psychological Record*. 2011;61(3):411-24.

26. Quinlan CK, Goldstein AL, Stewart SH. An investigation of the link between gambling motives and social context of gambling in young adults. *International Gambling Studies*. 2014;14(1):115-31.

27. Suurvali H, Hodgins DC, Cunningham JA. Motivators for resolving or seeking help for gambling problems: A review of the empirical literature. *Journal of Gambling Studies*. 2010;26(1):1-33.

28. Hodgins DC, Toneatto T, Makarchuk K, Skinner W, Vincent S. Minimal treatment approaches for concerned significant others of problem gamblers: A randomized controlled trial. *Journal of Gambling Studies*. 2007;23(2):215-30.

29. Binde P. Why people gamble: A model with five motivational dimensions. *International Gambling Studies*. 2012;13(1):81-97.

30. Afifi TO, Cox BJ, Martens PJ, Sareen J, Enns MW. The relationship between problem gambling and mental and physical health correlates among a nationally representative sample of Canadian women. *Canadian Journal of Public Health-Revue Canadienne De Sante Publique*. 2010;101(2):171-5.

31. Merkouris SS, Thomas SA, Browning CJ, Dowling NA. Predictors of outcomes of psychological treatments for disordered gambling: A systematic review. *Clinical Psychology Review*. 2016;48:7-31. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/review-individual-and-treatment-characteristics-affect-treatment-outcomes-disordered

32. Dickson LM, Derevensky JL, Gupta R. Harm reduction for the prevention of youth gambling problems. *Journal of Adolescent Research*. 2004;19(2):233-63.

33. Shaffer HJ, Forman DP, Scanlan KM, Smith F. *Journal of Gambling Studies*. 2000;16(1):93-101.

34. Delfabbro P, Lambos C, King D, Puglies S. Knowledge and beliefs about gambling in Australian secondary school students and their implications for education strategies. *Journal of Gambling Studies*. 2009;25(4):523-39.

35. Turner NE, Macdonald J, Somerset M. Life skills, mathematical reasoning and critical thinking: A curriculum for the prevention of problem gambling. *Journal of Gambling Studies*. 2008;24(3):367-80.

36. Walther B, Hanewinkel R, Morgenstern M. Short-term effects of a school-based program on gambling prevention in adolescents. *Journal of Adolescent Health*. 2013;52(5):599-605.

37. Keen B, Blaszczynski A, Anjoul F. Systematic Review of Empirically Evaluated School-Based Gambling Education Programs. *Journal of Gambling Studies*. 2017;33(1):301-25.

38. Williams RJ, West BL, Simpson RI. Prevention of problem and pathological gambling: A comprehensive review of the evidence. Guelph, ON: Gambling Research Exchange Ontario; 2008. Available from: https://www.uleth.ca/dspace/bitstream/handle/10133/414/2008-Prevention-OPGRC.pdf?sequence=7.

39. Ladouceur R, Goulet A, Vitaro F. Prevention programmes for youth gambling: A review of the empirical evidence. *International Gambling Studies*. 2013;13(2):141-59.

40. Lupu IR, Lupu V. Gambling prevention program for teenagers. *Journal of Evidence-Based Psychotherapies*. 2013;13(2A):575.

41. Castrén S, Perhoniemi R, Kontto J, Alho H, Salonen AH. Association between gambling harms and game types: Finnish population study. *International Gambling Studies*. 2018;18(1):124-42. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/exploring-gambling-harms-and-game-types-in-finnish-adult-gamblers

42. Derevensky JL, St-Pierre RA, Temcheff CE, Gupta R. Teacher awareness and attitudes regarding adolescent risky behaviours: Is adolescent gambling perceived to be a problem? *Journal of Gambling Studies*. 2014;30(2):435-51.

43. Ladouceur R, Ferland F, Côté M-A, Vitaro F. Teachers' knowledge and training needs regarding youth gambling. *School Psychology International*. 2004;25(4):472-9.

44. Pearce J, Mason K, Hiscock R, Day P. A national study of neighbourhood access to gambling opportunities and individual gambling behaviour. *Journal of Epidemiology and Community Health*. 2008;62(10):862-8.

45. Welte JW, Wieczorek WF, Barnes GM, Tidwell MC, Hoffman JH. The relationship of ecological and geographic factors to gambling behavior and pathology. *Journal of Gambling Studies*. 2004;20(4):405-23.

46. Wilson DH, Gilliland J, Ross NA, Derevensky J, Gupta R. Video lottery terminal access and gambling among high school students in Montreal. *Can J Public Health*. 2006;97(3):202-6.

47. Markham F, Young M, Doran B. The relationship between alcohol consumption, gambling behaviour and problem gambling during a single visit to a gambling venue. *Drug and Alcohol Review*. 2012.

48. Gilliland JA, Ross NA. Opportunities for video lottery terminal gambling in Montréal: An environmental analysis. *Canadian Journal of Public Health*. 2005;96(1):55-9.

49. Chalmers H, Willoughby T. Do predictors of gambling involvement differ across male and female adolescents? *Journal of Gambling Studies*. 2006;22(4):373-92.

50. Pearce J, Mason K, Hiscock R, Day P. A national study of neighbourhood access to gambling opportunities and individual gambling behaviour. *J Epidemiol Community Health*. 2008;62(10):862-8.

51. Planinac LC, Cohen JE, Reynolds J, Robinson DJ, Lavack A, Korn D. Lottery promotions at the point-of-sale in Ontario, Canada. *Journal of Gambling Studies*. 2011;27(2):345-54.

52. Rintoul AC, Livingstone C, Mellor AP, Jolley D. Modelling vulnerability to gambling related harm: How disadvantage predicts gambling losses. *Addiction Research and Theory*. 2012;21(4):329-38.

53. Griswold MT, Nichols MW. Social capital and casino gambling in U.S. communities. *Social Indicators Research*. 2006;77(3):369-94.

54. Uphoff EP, Pickett KE, Cabieses B, Small N, Wright J. A systematic review of the relationships between social capital and socioeconomic inequalities in health: A contribution to understanding the psychosocial pathway of health inequalities. *International Journal for Equity in Health*. 2013;12:54.

55. Tu D, Gray RJ, Walton DK. Household experience of gambling-related harm by socio-economic deprivation in New Zealand: increases in inequality between 2008 and 2012. *International Gambling Studies*. 2014;14(2):330-44.

56. Wardle H, Keily R, Astbury G, Reith G. 'Risky places?': Mapping gambling machine density and socio-economic deprivation. *Journal of Gambling Studies*. 2012;30(1):201-12.

57. Marshall DC, Baker RGV. The evolving market structures of gambling: Case studies modelling the socioeconomic assignment of gaming machines in Melbourne and Sydney, Australia. *Journal of Gambling Studies*. 2002;18(3):273-91.

58. Chaumeton NR, Ramowski SK, Nystrom RJ. Correlates of gambling among eighth-grade boys and girls. *Journal of School Health*. 2011;81(7):374-85.

59. Lussier ID, Derevensky J, Gupta R, Vitaro F. Risk, compensatory, protective, and vulnerability factors related to youth gambling problems. *Psychology of Addictive Behaviors*. 2014;28(2):404-13.

60. Welte JW, Wieczorek WF, Barnes GM, Tidwell M-CO. Multiple risk factors for frequent and problem gambling: Individual, social, and ecological. *Journal of Applied Social Psychology*. 2006;36(6):1548-68.

61. Marshall D. Gambling as a public health issue: The critical role of the local environment. Journal of Gambling Issues [Internet]. 2009; (23)66-80 pp.]. Available from: https://doi.org/10.4309/jgi.2009.23.4.

62. Marshall D, Baker R. Unfair odds? Factors influencing the distribution of electronic gaming machines in Melbourne. *Urban Policy and Research*. 2001;19(1):77-92.

63. Marshall DC, Baker RGV. Clubs, spades, diamonds and disadvantage: The geography of electronic gaming machines in Melbourne. *Australian Geographical Studies*. 2001;39(1):17-33.

64. Markham F, Young M, Doran B. The relationship between alcohol consumption, gambling behaviour and problem gambling during a single visit to a gambling venue. *Drug and Alcohol Review*. 2012;31(6):770-7.

65. Young M, Markham F, Doran B. Too close to home? The relationships between residential distance to venue and gambling outcomes. *International Gambling Studies*. 2012;12(2):257-73.

66. Livingstone C. The social economy of poker machine gambling in Victoria. *International Gambling Studies*. 2001;1(1):46-65.

67. Hing N, Holdsworth L, Tiyce M, Breen H. Stigma and problem gambling: Current knowledge and future research directions. *International Gambling Studies*. 2013;14(1):64-81.

68. Horch JD, Hodgins DC. Public stigma of disordered gambling: Social distance, dangerousness, and familiarity. *Journal of Social and Clinical Psychology*. 2008;27(5):505-28.

69. Breen H, Hing N, Gordon A, Holdsworth L. Indigenous Australians and their gambling help-seeking behaviour. In: Baek Y, editor. *Psychology of gaming: New research*. Hauppauge, NY: Nova Science Publishers; 2013. p. 93-120.

70. Dhillon J, Horch JD, Hodgins DC. Cultural influences on stigmatization of problem gambling: East Asian and caucasian Canadians. *Journal of Gambling Studies*. 2011;27(4):633-47.

71. Piquette-Tomei NA, Norman E, Dwyer SC, McCaslin E. Group therapy for women problem gamblers: A space of their own. Journal of Gambling Issues [Internet]. 2008; (22)275-96 pp.]. Available from: https://doi.org/10.4309/jgi.2008.22.8.

72. Horch J, Hodgins D. Stereotypes of problem gambling. Journal of Gambling Issues [Internet]. 2013; (28)19 p.]. Available from: https://doi.org/10.4309/jgi.2013.28.10.

73. Cunningham JA, Cordingley J, Hodgins DC, Toneatto T. Beliefs about gambling problems and recovery: Results from a general population telephone survey. *Journal of Gambling Studies*. 2011;27(4):625-31.

74. Gainsbury S, Hing N, Suhonen N. Professional help-seeking for gambling problems: Awareness, barriers and motivators for treatment. *Journal of Gambling Studies*. 2014;30(2):503-19.

75. Hing N, Tolchard B, Nuske E, Holdsworth L, Tiyce M. A process evaluation of a self-exclusion program: A qualitative investigation from the perspective of excluders and non-excluders. *International Journal of Mental Health and Addiction*. 2014;12(4):509-23.

76. Pulford J, Bellringer M, Abbott M, Clarke D, Hodgins D, Williams J. Barriers to help-seeking for a gambling problem: The experiences of gamblers who have sought specialist assistance and the perceptions of those who have not. *Journal of Gambling Studies*. 2009;25(1):33-48.

77. Suurvali H, Cordingley J, Hodgins DC. Barriers to seeking help for gambling problems: A review of the empirical literature. *Journal of Gambling Studies*. 2009;25(3):407–24.

78. Holdsworth L, Tiyce M. *Untangling the Complex Needs of People Experiencing Gambling Problems and Homelessness*2012.

79. Castellani B. *Pathological gambling: The making of a medical problem*. Albany, NY: State University of New York Press; 2000.

80. Rosecrance J. Compulsive gambling and the medicalization of deviance. *Social Problems*. 1985;32(3):275-84.

81. Reith G. Gambling and the contradictions of consumption: A genealogy of the "Pathological" subject. *American Behavioral Scientist*. 2007;51(1):33-55.

82. Turner NE, Ialomiteanu A, Paglia-Boak A, Adlaf EM. A typological study of gambling and substance use among adolescent students. Journal of Gambling Issues [Internet]. 2011; (25)88-107 pp.]. Available from: https://doi.org/10.4309/jgi.2011.25.7.

83. Williams RJ, Royston J, Hagen BF. Gambling and problem gambling within forensic populations: A review of the literature. *Criminal Justice and Behavior*. 2005;32(6):665-89.

84. Widinghoff C, Berge J, Wallinius M, Billstedt E, Hofvander B, Hakansson A. Gambling disorder in male violent offenders in the prison system: Psychiatric and substance-related comorbidity. *Journal of Gambling Studies*. 2018.

85. Laursen B, Plauborg R, Ekholm O, Larsen CV, Juel K. Problem gambling associated with violent and criminal behaviour: A Danish population-based survey and register study. *Journal of Gambling Studies*. 2016;32(1):25-34.

86. Abbott MW, McKenna BG. Gambling and problem gambling among recently sentenced women in New Zealand prisons. *Journal of Gambling Studies*. 2005;21(4):559-81.

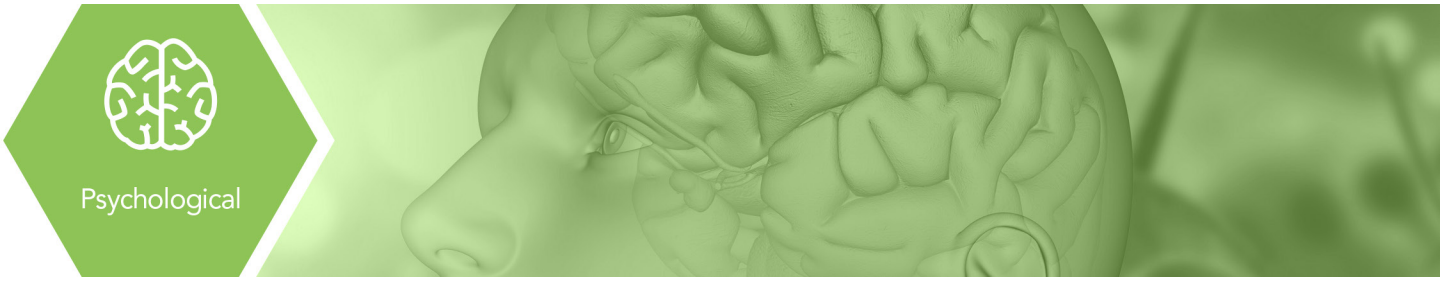
87. Abbott MW, McKenna BG, Giles LC. Gambling and problem gambling among recently sentenced male prisoners in four New Zealand prisons. *Journal of Gambling Studies*. 2005;21(4):537-58.

88. Mestre-Bach G, Steward T, Granero R, Fernandez-Aranda F, Talon-Navarro MT, Cuquerella A, et al. Gambling and impulsivity traits: A recipe for criminal behavior? *Frontiers in Psychology*. 2018;9(6):1-10.

89. Binde P. Gambling-related embezzlement in the workplace: a qualitative study. *International Gambling Studies*. 2016;16(3):391-407. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/gambling-related-embezzlement-in-the-workplace-usually-progresses-in-a-typical-wa

90. Dowling N, Suomi A, Jackson A, Lavis T, Patford J, Cockman S, et al. Problem gambling and intimate partner violence: A systematic review and meta-analysis. *Trauma Violence and Abuse*. 2016;17(1):43-61.

91. Griffiths M, Parke A, Parke J. Gambling-related violence: An issue for the police? *The Police Journal*. 2005;78(3):223-7.



3.3 PSYCHOLOGICAL FACTORS

The psychological basis for harmful gambling is rooted in a number of different factors and is influenced by an individual's biology and the broader environment. Depending on the person's psychological characteristics, he or she may be more or less likely to be susceptible to developing harmful gambling habits. This susceptibility could be aggravated by other psychological disorders or addictions; for example, someone might seemingly gamble for entertainment purposes without realizing that underlying psychological issues, such as using gambling to cope with negative emotions, could lead to a chronic gambling habit.

In this section we discuss psychological factors that contribute to harmful gambling, including: personality and temperament, coping styles, self-perceptions, social learning, lifespan development, co-morbid disorders, subjective well-being, adverse childhood experiences, and judgment and decision making. There is a considerable amount of research that supports the existence of relationships between these risk factors and gambling problems, although the strength of the evidence varies from factor to factor, as outlined below.

It is important to note that until recently research on the psychological factors influencing gambling-related harm has been almost entirely cross-sectional (i.e., limited to one point in time). Although there is now some longitudinal research supporting the role of psychological characteristics in gambling, more research is needed to provide further support and insight into these factors.

3.3.1 PERSONALITY AND TEMPERAMENT

Personality and temperament are broad constructs and refer to individual differences in thoughts, feelings, and actions. Certain personality and temperament characteristics are frequently associated with harmful gambling. A consistent finding is that people with higher levels of impulsivity, including *delayed discounting* (where immediate outcomes have more value than outcomes that are more remote in time), are more likely to engage in gambling and report harmful levels of gambling.[1-3] *Negative urgency* (i.e., the tendency to act recklessly when stressed) has emerged as a particularly important aspect of impulsivity that is associated with gambling and harmful gambling in both cross-sectional and longitudinal studies.[4-7]

The relationship between the Five-Factor Model of personality and gambling has been investigated, with lower conscientiousness, lower agreeableness, and higher neuroticism being associated with harmful gambling.[8] A sixth personality dimension, honesty-

humility (at lower levels), has also been linked to greater involvement in gambling.[9] Other personality and temperament traits that have been associated with harmful gambling include sensation-seeking,[10-12] novelty-seeking,[13, 14] low levels of willpower (or *trait self-control*),[15] low behavioural control,[16] and emotional vulnerability, including harm avoidance and others.[17-19]

Personality disorders also co-occur frequently with harmful gambling. A recent meta-analysis found that almost half of people seeking treatment for gambling problems had a personality disorder at the same time.[1, 20] Personality disorders that are most likely to co-occur with harmful gambling are narcissistic, antisocial, avoidant, obsessive-compulsive, and borderline.[20]

3.3.2 COPING STYLES

People with gambling problems tend to use avoidance and emotional coping when they experience difficulties, as opposed to using a problem-solving approach.[21] In turn, the use of avoidant coping strategies has been associated with increased levels of harmful gambling among both adults[22] and adolescents.[23-25] The lack of problem-solving abilities may be caused by deficits in aspects of working memory, planning, cognitive flexibility (i.e., the ability to switch thinking from one concept or idea to another), and time management/ estimation, all of which have been reported to be more prevalent among people with gambling problems when compared to healthy volunteers.[26]

3.3.3 SELF-PERCEPTIONS

The perception of self is created as the person monitors his or her behaviour, emotions, and mental states in relation to others. In some cases, low self-esteem is associated with heavy gambling,[27, 28] although not all studies have found this.[29] Gambling in and among a group of people— such as at the table games or a casino— allows individuals to demonstrate a number of characteristics about themselves with the ultimate aim of gaining prestige. Therefore, it can be seen as an opportunity to increase self-esteem. Some of these features include the ability to play the game with skill, the willingness to take risks, the means to spend money on such games, and the capacity to maintain composure despite suffering losses or winning. Some people may also perceive themselves to be *professional gamblers*, which is associated with harmful gambling.[30]

Such group-based gambling games provide an arena for flamboyant self-display intended to impress fellow players and onlookers. People who gamble for these reasons are likely to spend relatively large amounts of money. Additionally, having a financially focused self-concept is related to harmful gambling.[31, 32]

Unfortunately, with high financial stakes, gamblers risk getting into a harmful, addictive game playing cycle either because they believe themselves to be on a winning streak or in a desperate attempt to win back large losses. Gambling may also change how someone perceives him or herself, with harmful levels of gambling more likely to make people feel that their gambling behaviour has changed their self-concept for the worse.[33]

3.3.4 SOCIAL LEARNING

The social learning sub-factor highlights the importance of the social environment(s) in which a person functions and the influence on gambling behaviour. The result of these influences is, at the extremes, either a higher tendency towards addictive gambling behaviour, or a rejection of gambling altogether. Information on gender differences in the socialization to gambling is included in Section 3.1.6 Gender.

In contrast to individuals who gamble because of social learning from family members, there are people whose negative experiences with the psychological, physical, and financial toll of gambling addiction among family members or friends can lead to less gambling or no gambling at all. However, even in households where one or both parents do not gamble, substantial proportions of children will engage in one or more gambling activities.[34]

3.3.5 LIFESPAN DEVELOPMENT

Age is often related to gambling and harmful gambling. In most, but not all, jurisdictions, younger people are more likely to gamble and have gambling-related problems, although this appears to be changing. For example, a study with almost 5,000 participants found that while gambling frequency increased in teenage years, the highest involvement occurred in the twenties and thirties. People in older age groups were less involved.[35] Still, harmful gambling can also occur among older populations.[36, 37] Younger age of first gambling is also linked to a higher probability of harmful gambling.[12] However, gambling involvement and harmful gambling tend to be fluid with earlier involvement not predicting later involvement.[38, 39]

The relationship between lifespan developmental factors and gambling is complex, since people in different age groups have been exposed to different gambling opportunities and attitudes as legalized gambling has expanded (see Section 3.1.3 Socio-Cultural Attitudes). Availability of leisure time and disposable income also vary across the lifespan. This can impact the inclination to gamble and the risk of engaging in harmful gambling.

3.3.6 COMORBID DISORDERS

Comorbid mental health disorders have been linked to problem and pathological gambling. In particular, strong links have been found with mood disorders such as major depression, anxiety disorders, and substance use disorders in community samples.[40] Among people seeking treatment for gambling problems, almost 75% have a comorbid mental health disorder, with mood and substance use disorders being most frequent.[20] Harmful gambling and nicotine use are also highly associated.[41] Links with lower base rate disorders such as eating disorders,[42-44] psychosis,[45-48] attention deficit disorder,[49, 50] obsessive compulsive disorder,[51] post-traumatic stress disorder,[52] and other behavioural addictions including compulsive shopping,[53] video games,[54] and problematic internet use[55] have also been observed. In addition to being highly comorbid, experimental studies have also demonstrated that substance use (alcohol, nicotine) can increase harmful gambling behaviours.[56-58]

It is now well-established that the comorbid mental health and substance use disorders are common among people with gambling disorder. Less is known

about the clinical and psychological correlates of co-occurring gambling and other mental health/substance use disorders or whether the mental disorder was present before harmful gambling or vice versa (*temporal sequencing*).[59] Recent studies suggest that people with both gambling and mental health disorders report a greater severity of gambling, distress, are more likely to have other mental health disorders, and have a poorer response to treatment.[43, 48, 60] In regard to temporal sequencing, gambling can occur before and/or after the onset of psychological disorders.[61-65] These results suggest that a shared vulnerability could be the cause of these high rates of comorbidity, with impulsivity identified as one potential vulnerability.[62, 66, 67] While this is informative, more research is needed to identify other shared vulnerabilities.

A final relatively common comorbidity is the higher than expected prevalence of gambling disorder among people with Parkinson's disorder who receive dopamine agonist treatment.[68, 69] Prevalence estimates range from 2.2 to 7.0%.[68] Patients with other risk factors for gambling disorder (e.g., impulsivity) are most at risk.[68]

3.3.7 SUBJECTIVE WELL-BEING

Harmful gambling typically involves significant distress. Poorer subjective well-being is also linked with harmful gambling.[70-72] In contrast, stronger feelings of well-being are related to social, responsible gambling involvement.[73] Higher levels of negative emotions or distress are strongly associated with harmful gambling,[74, 75] as are higher stress levels.[76]

3.3.8 ADVERSE CHILDHOOD EXPERIENCES

Adversity in childhood has been robustly linked to harmful gambling,[77-80] although longitudinal studies in this area are lacking.[81] Examples of adverse childhood experiences include not only traumatic experiences, but also involve other difficulties such as emotional and/or physical neglect; parental separation or divorce; and household substance use, mental illness, and incarceration. No one specific adverse childhood experience has been found to be most important in harmful gambling. Rather, it seems that the more adversity a person experiences in childhood, the greater the risk that he or she will experience harmful gambling.[82]

3.3.9 JUDGMENT AND DECISION MAKING

People with gambling problems often display faulty beliefs about gambling, termed *gambling-related cognitive distortions*. These distortions can be measured by asking gamblers to verbalize their thoughts during play (the *think aloud* technique) or with questionnaire measures (for reviews, see Goodie and Fortune,[83] and Leonard and Williams[84]). These decision making errors are intensified in people with gambling problems, and have been shown to pre-date gambling problems in a longitudinal study.[85]

The field of Judgment and Decision Making lies at the intersection of psychology and economics. It aims to characterize how healthy people evaluate risks and choose between available decision options. Many of the biases described in this field are relevant to gambling behaviour; for example:

- In estimating the likelihood of events, people tend to over-estimate rare events (termed *probability weighting*), such as their chances of winning a jackpot (see Ligneul et al.[86]).
- In relating objective gains and losses to subjective (i.e. personal) value, people tend to place greater weight on losses compared to gains of equivalent size. This *loss aversion* may be reduced in people with gambling problems.[87]
- In many situations, people do not undertake a cost-benefit mathematical analysis, but rely instead on shortcuts (termed *heuristics*) to make a quick decision (for examples in sports betting, see d'Astous and Di Gaspero,[88] and Newall[89]).

In gambling situations, some common errors are the biased evaluation of gambling outcomes (e.g., attributing wins to skill and losses to bad luck), the *illusion of control* over gambling outcomes (e.g., superstitions or behavioural rituals that are designed to increase wins), and failing to recognize statistical independence of turns (i.e. the *Gamblers' Fallacy*).[90] These gambling-related cognitive distortions can be encouraged by different gambling types and features, such as a stop button on a slot machine leading one to believe they can control the outcomes. They may also be enhanced by alcohol[56] or other intoxicating substances. This has implications for regulating the availability of these substances in gambling venues. Recent interest in *nudge theory*[91] considers how choice can be framed to encourage people to make better decisions, with likely implications for reducing gambling harms.

REFERENCES

1. Odlaug BL, Schreiber LR, Grant JE. Personality dimensions and disorders in pathological gambling. *Current Opinion in Psychiatry*. 2013;26(1):107-12.

2. Amlung M, Vedelago L, Acker J, Balodis I, MacKillop J. Steep delay discounting and addictive behavior: A meta-analysis of continuous associations. *Addiction*. 2017;112(1):51-62.

3. Chowdhury NS, Livesey EJ, Blaszczynski A, Harris JA. Pathological gambling and motor impulsivity: A systematic review with meta-analysis. *Journal of Gambling Studies*. 2017;33(4):1213-39. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/reviewing-evidence-of-motor-impulsivity-in-pathological-gambling

4. Farstad SM, von Ranson KM, Hodgins DC, El-Guebaly N, Casey DM, Schopflocher DP. The influence of impulsiveness on binge eating and problem gambling: A prospective study of gender differences in Canadian adults. *Psychology of Addictive Behaviors*. 2015;29(3):805-12. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/does-impulsiveness-predict-binge-eating-and-problem-gambling

5. Kim HS, Poole JC, Hodgins DC, McGrath DS, Dobson KS. Betting to deal: Coping motives mediate the relationship between urgency and problem gambling severity. *Addiction Research and Theory*. 2018:1-9.

6. Haw J. Impulsivity predictors of problem gambling and impaired control. *International Journal of Mental Health and Addiction*. 2015;15(1):154-65.

7. Savvidou LG, Fagundo AB, Fernandez-Aranda F, Granero R, Claes L, Mallorqui-Baque N, et al. Is gambling disorder associated with impulsivity traits measured by the UPPS-P and is this association moderated by sex and age? *Comprehensive Psychiatry*. 2017;72:106-13.

8. Maclaren VV, Fugelsang JA, Harrigan KA, Dixon MJ. The personality of pathological gamblers: A meta-analysis. *Clinical Psychology Review*. 2011;31(6):1057-67.

9. McGrath DS, Neilson T, Lee K, Rash CL, Rad M. Associations between the HEXACO model of personality and gambling involvement, motivations to gamble, and gambling severity in young adult gamblers. *Journal of Behavioral Addictions*. 2018;7(2):392-400.

10. Harris N, Newby J, Klein RG. Competitiveness facets and sensation seeking as predictors of problem gambling among a sample of university student gamblers. *Journal of Gambling Studies*. 2015;31(2):385-96.

11. Estevez A, Herrero-Fernandez D, Sarabia I, Jauregui P. The impulsivity and sensation-seeking mediators of the psychological consequences of pathological gambling in adolescence. *Journal of Gambling Studies*. 2015;31(1):91-103. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/the-impulsivity-and-sensation-seeking-mediators-of-the-psychological-consequences

12. Johansson A, Grant JE, Kim SW, Odlaug BL, Gotestam KG. Risk factors for problematic gambling: A critical literature review. *Journal of Gambling Studies*. 2009;25(1):67-92.

13. Black DW, Coryell WH, Crowe RR, Shaw M, McCormick B, Allen J. Personality disorders, impulsiveness, and novelty seeking in persons with DSM-IV pathological gambling and their first-degree relatives. *Journal of Gambling Studies*. 2015;31(4):1201-14.

14. McCormick J, Delfabbro P, Denson LA. Psychological vulnerability and problem gambling: an application of Durand Jacobs' general theory of addictions to electronic gaming machine playing in Australia. *Journal of Gambling Studies*. 2012;28(4):665-90.

15. Bergen AE, Newby-Clark IR, Brown A. Low trait self-control in problem gamblers: Evidence from self-report and behavioral measures. *Journal of Gambling Studies*. 2012;28(4):637-48.

16. Savage JE, Slutske WS, Martin NG. Personality and gambling involvement: A person-centered approach. *Psychology of Addictive Behaviors*. 2014;28(4):1198-211. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/personality-and-gambling-involvement-person-centered-approach

17. Nordin C, Nylander PO. Temperament and character in pathological gambling. *Journal of Gambling Studies*. 2007;23(2):113-20.

18. Bagby RM, Vachon DD, Bulmash EL, Toneatto T, Quilty LC, Costa PT. Pathological gambling and the five-factor model of personality. *Personality and Individual Difference*. 2007;43(4):873-80.

19. Bagby RM, Vachon DD, Bulmash E, Quilty LC. Personality disorders and pathological gambling: A review and re-examination of prevalence rates. *Journal of Personality Disorders*. 2008;22(2):191-207.

20. Dowling NA, Cowlishaw S, Jackson AC, Merkouris SS, Francis KL, Christensen DR. The prevalence of comorbid personality disorders in treatment-seeking problem gamblers: A systematic review and meta-analysis. *Journal of Personality Disorders*. 2015;29(6):735-54.

21. Borsoi D, Toneatto T. Problem-solving skills in male and female problem gamblers. Journal of Gambling Issues [Internet]. 2003; (8). Available from: https://doi.org/10.4309/jgi.2003.8.14.

22. Jauregui P, Onaindia J, Estevez A. Adaptive and maladaptive coping strategies in adult pathological gamblers and their mediating role with anxious-depressive symptomatology. *Journal of Gambling Studies*. 2017;33(4):1081-97.

23. Matheson K, Wohl MJA, Anisman H. The interplay of appraisals, specific coping styles, and depressive symptoms among young male and female gamblers. *Journal of Social Psychology*. 2009;40(4):212-21.

24. Calado F, Alexandre J, Griffiths MD. How coping styles, cognitive distortions, and attachment predict problem gambling among adolescents and young adults. *Journal of Behavioral Addictions*. 2017:1-10.

25. Lostutter TW, Larimer ME, Neighbors C, Kaljee LM. Perceived stress and avoidant coping moderate disordered gambling among emerging adults in Vietnam. *Youth and Society*. 2011;45(1):117-39.

26. Hodgins DC, Stea JN, Grant JE. Gambling disorders. *Lancet*. 2011;378(9806):1874-84.

27. Delfabbro P, Lahn J, Grabosky P. Psychosocial correlates of problem gambling in Australian students. *The Australian and New Zealand Journal of Psychiatry*. 2006;40(6-7):587-95.

28. Kaare PR, Mottus R, Konstabel K. Pathological gambling in Estonia: Relationships with personality, self-esteem, emotional states and cognitive ability. *Journal of Gambling Studies*. 2009;25(3):377-90.

29. Suen V, Brown MRG, Morck RK, Cribben I, Silverstone PH. Risk tolerance, impulsivity, and self-esteem: Differences and similarities between gamblers and non-gamblers in a pilot study. *Advances in Social Sciences Research Journal*. 2017;4(4):173-86.

30. Hing N, Russell A, Blaszczynski A, Gainsbury SM. What's in a name? Assessing the accuracy of self-identifying as a professional or semi-professional gambler. *Journal of Gambling Studies*. 2015;31(4):1799-818. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/do-professional-and-semi-professional-gamblers-accurately-identify-themselves

31. Tabri N, Wohl MJA, Eddy KT, Thomas JJ. Me, myself and money: Having a financially focused self-concept and its consequences for disordered gambling. *International Gambling Studies*. 2016;17(1):30-50.

32. Tabri N, Shead N, Wohl MJA. Me, myself, and money II: Relative deprivation predicts disordered gambling severity via delay discounting, especially among gamblers who have a financially focused self-concept. *Journal of Gambling Studies*. 2017;33(4):1201-11.

33. Wohl MJA, Kim HS, Salmon M, Santesso D, Wildschut T, Sedikides C. Discontinuity-induced nostalgia improves the odds of a self-reported quit attempt among people living with addiction. *Journal of Experimental Social Psychology*. 2018;75:83-94.

34. Sleczka P, Braun B, Grüne B, Bühringer G, Kraus L. Family functioning and gambling problems in young adulthood: The role of the concordance of values. *Addiction Research and Theory*. 2017:1-10.

35. Welte JW, Barnes GM, Tidwell MC, Hoffman JH. Gambling and problem gambling across the lifespan. *Journal of Gambling Studies*. 2011;27(1):49-61.

36. Thompson KM, McNeilly DP. Populations at risk for a gambling disorder: Older adults. *Current Addiction Reports*. 2016;3(3):275-9. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/older-adults-are-more-vulnerable-to-the-negative-effects-of-problem-gambling

37. Subramaniam M, Wang P, Soh P, Vaingankar JA, Chong SA, Browning CJ, et al. Prevalence and determinants of gambling disorder among older adults: A systematic review. *Addictive Behaviors*. 2015;41:199-209.

38. Edgerton JD, Melnyk TS, Roberts LW. Problem gambling and the youth-to-adulthood transition: Assessing problem gambling severity trajectories in a sample of young adults. *Journal of Gambling Studies*. 2015;31(4):1463-85. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/does-youth-gambling-lead-problem-gambling-adulthood

39. Delfabbro P, King D, Griffiths MD. From adolescent to adult gambling: An analysis of longitudinal gambling patterns in South Australia. *Journal of Gambling Studies*. 2014;30(3):547-63.

40. Lorains FK, Cowlishaw S, Thomas SA. Prevalence of comorbid disorders in problem and pathological gambling: systematic review and meta-analysis of population surveys. *Addiction*. 2011;106(3):490-8.

41. McGrath DS, Barrett SP. The comorbidity of tobacco smoking and gambling: A review of the literature. *Drug and Alcohol Review*. 2009;28(6):676-81.

42. von Ranson KM, Wallace LM, Holub A, Hodgins DC. Eating disorders, substance use disorders, and impulsiveness among disordered gamblers in a community sample. *European Eating Disorders Review*. 2013;21(2):148-54.

43. Kim HS, von Ranson KM, Hodgins DC, McGrath DS, Tavares H. Demographic, psychiatric, and personality correlates of adults seeking treatment for disordered gambling with a comorbid binge/purge type eating disorder. *European Eating Disorders Review*. 2018.

44. Jimenez-Murcia S, Steiger H, Israel M, Granero R, Prat R, Santamaria JJ, et al. Pathological gambling in eating disorders: Prevalence and clinical implications. *Comprehensive Psychiatry*. 2013;54(7):1053-60.

45. Haydock M, Cowlishaw S, Harvey C, Castle D. Prevalence and correlates of problem gambling in people with psychotic disorders. *Comprehensive Psychiatry*. 2015;58:122-9.

46. Yakovenko I, Fortgang R, Prentice J, Hoff RA, Potenza MN. Correlates of frequent gambling and gambling-related chasing behaviors in individuals with schizophrenia-spectrum disorders. *Journal of Behavioral Addictions*. 2018;7(2):375-83.

47. Jacob L, Haro JM, Koyanagi A. The association between problem gambling and psychotic experiences: Findings from the Adult Psychiatric Morbidity Survey 2007. *Schizophrenia Research*. 2018.

48. Cassetta BD, Kim HS, Hodgins DC, McGrath DS, Tomfohr-Madsen LM, Tavares H. Disordered gambling and psychosis: Prevalence and clinical correlates. *Schizophrenia Research*. 2018;192:463-4.

49. Karaca S, Saleh A, Canan F, Potenza MN. Comorbidity between behavioral addictions and attention deficit/hyperactivity disorder: A systematic review. *International Journal of Mental Health and Addiction*. 2016;15(3):701-24.

50. Fatseas M, Alexandre JM, Venisse JL, Romo L, Valleur M, Magalon D, et al. Gambling behaviors and psychopathology related to attention-deficit/hyperactivity disorder (ADHD) in problem and non-problem adult gamblers. *Psychiatry Research*. 2016;239:232-8. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/attention-deficithyperactivity-disorder-adhd-increases-risk-problem-gambling-and-mental

51. Durdle H, Gorey KM, Stewart SH. A meta-analysis examining the relations among pathological gambling, obsessive-compulsive disorder, and obsessive-compulsive traits. *Psychological Reports*. 2008;103(2):485-98.

52. Najavits LM, Meyer T, Johnson KM, Korn D. Pathological gambling and posttraumatic stress disorder: A study of the co-morbidity versus each alone. *Journal of Gambling Studies*. 2011;27(4):663-83.

53. Granero R, Fernandez-Aranda F, Steward T, Mestre-Bach G, Bano M, Del Pino-Gutierrez A, et al. Compulsive buying behavior: Characteristics of comorbidity with gambling disorder. *Frontiers in Psychology*. 2016;7:625. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/similarities-between-compulsive-buying-behaviour-and-gambling-disorder

54. Jimenez-Murcia S, Fernandez-Aranda F, Granero R, Choliz M, La Verde M, Aguglia E, et al. Video game addiction in gambling disorder: Clinical, psychopathological, and personality correlates. *Biomed Research International* [Internet]. 2014; 2014:Article 315062 [11 p.]. Available from: https://doi.org/10.1155/2014/315062.

55. Baggio S, Gainsbury SM, Berchtold A, Iglesias K. Co-morbidity of gambling and Internet use among Internet and land-based gamblers: classic and network approaches. *International Gambling Studies*. 2016;16(3):500-17.

56. Ellery M, Stewart SH. Alcohol affects video lottery terminal (VLT) gambling behaviors and cognitions differently. *Psychology of Addictive Behaviors*. 2014;28(1):206-16.

57. McGrath DS, Dorbeck A, Barrett SP. The influence of acutely administered nicotine on cue-induced craving for gambling in at-risk video lottery terminal gamblers who smoke. *Behavioural Pharmacology*. 2013;24(2):124-32.

58. Barrett SP, Collins P, Stewart SH. The acute effects of tobacco smoking and alcohol consumption on video-lottery terminal gambling. *Pharmacology, Biochemistry, and Behavior*. 2015;130:34-9.

59. Yakovenko I, Hodgins DC. A scoping review of co-morbidity in individuals with disordered gambling. *International Gambling Studies*. 2017;18(1):143-72. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/a-review-of-current-research-on-disordered-gambling-and-comorbidity

60. Merkouris SS, Thomas SA, Browning CJ, Dowling NA. Predictors of outcomes of psychological treatments for disordered gambling: A systematic review. *Clinical Psychology Review*. 2016;48:7-31. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/review-individual-and-treatment-characteristics-affect-treatment-outcomes-disordered

61. Hartmann M, Blaszczynski A. The longitudinal relationships between psychiatric disorders and gambling disorders. *International Journal of Mental Health and Addiction*. 2016;16(1):16-44. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/what-comes-first-gambling-disorder-or-comorbid-conditions

62. Dussault F, Brendgen M, Vitaro F, Wanner B, Tremblay RE. Longitudinal links between impulsivity, gambling problems and depressive symptoms: A transactional model from adolescence to early adulthood. *Journal of Child Psychology and Psychiatry*. 2011;52(2):130-8.

63. Chinneck A, Mackinnon SP, Stewart SH. Investigating possible reciprocal relations between depressive and problem gambling symptoms in emerging adults. *Canadian Journal of Psychiatry-Revue Canadienne De Psychiatrie*. 2016;61(2):93-101.

64. Afifi TO, Nicholson R, Martins SS, Sareen J. A longitudinal study of the temporal relation between problem gambling and mental and substance use disorders among young adults. *Canadian Journal of Psychiatry-Revue Canadienne De Psychiatrie*. 2016;61(2):102-11. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/longitudinal-study-problem-gambling-mental-health-disorders-and-drug-use-among-young-adults

65. Parhami I, Mojtabai R, Rosenthal RJ, Afifi TO, Fong TW. Gambling and the onset of comorbid mental disorders: A longitudinal study evaluating severity and specific symptoms. *Journal of Psychiatric Practice*. 2014;20(3):207-19.

66. Boothby CA, Kim HS, Romanow NK, Hodgins DC, McGrath DS. Assessing the role of impulsivity in smoking and non-smoking disordered gamblers. *Addictive Behaviors*. 2017;70:35-41.

67. Kim HS, Cassetta BD, Hodgins DC, Tomfohr-Madsen LM, McGrath DS, Tavares H. Assessing the Relationship between Disordered Gamblers with Psychosis and Increased Gambling Severity: The Mediating Role of Impulsivity. *Canadian Journal of Psychiatry-Revue Canadienne De Psychiatrie*. 2018;63(6):370-7.

68. Santangelo G, Barone P, Trojano L, Vitale C. Pathological gambling in Parkinson's disease. A comprehensive review. *Parkinsonism and Related Disorders*. 2013;19(7):645-53.

69. Djamshidian A, Cardoso F, Grosset D, Bowden-Jones H, Lees AJ. Pathological gambling in Parkinson's disease - A review of the literature. *Movement Disorders*. 2011;26(11):1976-84.

70. Afifi TO, Cox BJ, Martens PJ, Sareen J, Enns MW. The relationship between problem gambling and mental and physical health correlates among a nationally representative sample of Canadian women. *Canadian Journal of Public Health-Revue Canadienne De Sante Publique*. 2010;101(2):171-5.

71. Loo JM, Shi Y, Pu X. Gambling, drinking and quality of life: Evidence from Macao and Australia. *Journal of Gambling Studies*. 2016;32(2):391-407.

72. Tang CS-k, Oei TP. Gambling cognition and subjective well-being as mediators between perceived stress and problem gambling: A cross-cultural study on white and Chinese problem gamblers. *Psychology of Addictive Behaviors*. 2011;25(3):511-20.

73. Lee J, Chen CC, Song HJ, Lee CK. The role of responsible gambling strategy and gambling passion in the online gamblers' decision making process: Revising the theory of planned behavior. *Journal of Gambling Studies*. 2014;30(2):403-22.

74. Rogier G, Velotti P. Conceptualizing gambling disorder with the process model of emotion regulation. *Journal of Behavioral Addictions*. 2018;7(2):239-51.

75. Williams AD, Grisham JR, Erskine A, Cassedy E. Deficits in emotion regulation associated with pathological gambling. *British Journal of Clinical Psychology*. 2012;51(2):223-38.

76. Biback C, Zack M. The relationship between stress and motivation in pathological gambling: A focused review and analysis. *Current Addiction Reports*. 2015;2(3):230-9.

77. Felsher JR, Derevensky JL, Gupta R. Young adults with gambling problems: The impact of childhood maltreatment. *International Journal of Mental Health and Addiction*. 2009;8(4):545-56.

78. Hodgins DC, Schopflocher DP, el-Guebaly N, Casey DM, Smith GJ, Williams RJ, et al. The association between childhood maltreatment and gambling problems in a community sample of adult men and women. *Psychology of Addictive Behaviors*. 2010;24(3):548-54.

79. Imperatori C, Innamorati M, Bersani FS, Imbimbo F, Pompili M, Contardi A, et al. The association among childhood trauma, pathological dissociation and gambling severity in casino gamblers. *Clinical Psychology and Psychotherapy*. 2017;24(1):203-11.

80. Schwaninger PV, Mueller SE, Dittmann R, Poespodihardjo R, Vogel M, Wiesbeck GA, et al. Patients with non-substance-related disorders report a similar profile of childhood trauma experiences compared to heroin-dependent patients. *The American Journal on Addictions*. 2017;26(3):215-20.

81. Konkolÿ Thege B, Horwood L, Slater L, Tan MC, Hodgins DC, Wild TC. Relationship between interpersonal trauma exposure and addictive behaviors: A systematic review. *BMC Psychiatry*. 2017;17(1):164.

82. Poole JC, Kim HS, Dobson KS, Hodgins DC. Adverse childhood experiences and disordered gambling: Assessing the mediating role of emotion dysregulation. *Journal of Gambling Studies*. 2017;33(4):1187-200.

83. Goodie AS, Fortune EE. Measuring cognitive distortions in pathological gambling: review and meta-analyses. *Psychology of Addictive Behaviors*. 2013;27(3):730-43.

84. Leonard C, Williams RJ, Vokey J. Gambling fallacies: What are they and how are they best measured? Journal of Addiction Research and Therapy [Internet]. 2015; 6(4)9 p.]. Available from: https://doi.org/10.4172/2155-6105.1000256. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/what-are-gambling-fallacies-and-how-are-they-best-measured

85. Yakovenko I, Hodgins D, el-Guebaly N, Casey D, R. Currie S, Smith G, et al. Cognitive distortions predict future gambling involvement. *International Gambling Studies*. 2016;16(2):175-92. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/cognitive-distortions-influence-gambling-involvement-over-time

86. Ligneul R, Sescousse G, Barbalat G, Domenech P, Dreher JC. Shifted risk preferences in pathological gambling. *Psychological Medicine*. 2013;43(5):1059-68.

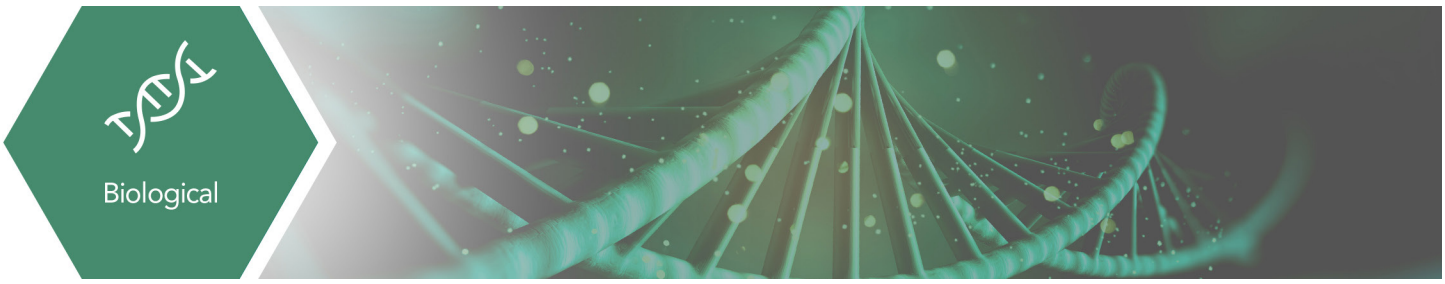
87. Genauck A, Quester S, Wüstenberg T, Mörsen C, Heinz A, Romanczuk-Seiferth N. Reduced loss aversion in pathological gambling and alcohol dependence is associated with differential alterations in amygdala and prefrontal functioning. *Scientific Reports*. 2017;7(1):16306. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/abnormal-brain-activity-may-explain-lower-loss-aversion-in-individuals-addicted-t

88. d'Astous A, Di Gaspero M. Heuristic and analytic processing in online sports betting. *Journal of Gambling Studies*. 2015;31(2):455-70.

89. Newall PWS. How bookies make your money. *Judgement and Decision Making*. 2015;10(3):225-31.

90. Toneatto T, Nguyen L. Individual characteristics and problem gambling behaviour. In: Smith G, Hodgins DC, Williams R, editors. *Research and measurement issues in gambling studies*. New York, NY: Elsevier; 2007. p. 279-303.

91. Thaler RH, Sunstein CR. *Nudge: Improving decisions about health, wealth, and happiness*: Penguin Books; 2009.



3.4 BIOLOGICAL FACTORS

Biological factors may help explain why some people and not others develop harmful gambling. These biological factors may have a genetic, heritable component, and/or be shaped by environmental factors such as childhood adversity. There is a large body of research that describes biological differences, for example in brain structure and chemistry, between people with gambling problems and healthy comparison groups. The evidence is very strong that neurobiological factors play a role in gambling and harmful gambling. As much of this evidence is gathered at a single time point (also known as 'cross-sectional' data) it is less clear whether these differences reflect vulnerability to problem gambling, or a consequence of prolonged gambling. Genetic studies provide strong evidence that a genetic vulnerability to harmful gambling exists, but it is less clear what specific genes and neurotransmitters are involved, and how the mechanisms that affect those genes are expressed (epigenetics). In this section we discuss biological factors that contribute to harmful gambling, including genetic inheritance and neurobiology.

3.4.1 GENETIC INHERITANCE

Studies on families help to give some insight into the extent of genetic inheritance of harmful gambling. Indeed, harmful gambling is significantly more common in the relatives of problem gamblers. However, there is considerable variability in the extent to which this occurs, with rates ranging from 8% to 50%.[1-4] The variability among studies is partly a function of differences in how harmful gambling is defined or assessed, and whether first, second, or third degree relatives are being examined.

Regardless of the exact percentage, studies of families do not answer the more important question concerning whether the higher rate is due to genetic inheritance or environmental influences. Twin studies are the gold standard design to disentangle these contributions, and rely on the comparison of 'concordance rates' for the illness between identical (monozygotic, or MZ) twin pairs and non-identical (dizygotic, or DZ) twin pairs. Twin studies indicate that genetic factors account for approximately 50% of the propensity to develop problem gambling[3, 5, 6] (see Lobo[7] for review).

Heritability estimates should be treated with caution: past studies of gambling are based mostly on male twin pairs (although heritability appears similar where female twins have been tested[3]), and include a substantial proportion of people that may not have a clinical problem gambling diagnosis.[7] More generally, heritability estimates are population statistics that do not reveal the relative balance of factors within any individual,(i.e., a heritability of 50% does not

mean that in any person with a gambling problem, half their risk is genetic and half is environmental). Heritability estimates are also modified by changes to the environment (e.g., to gambling availability). Nevertheless, the estimates for problem gambling are consistent with corresponding heritability estimates for substance dependence (30 to 70%[8, 9]) and most major psychiatric disorders.[6] Indeed, the high degree of comorbidity among harmful gambling, substance use disorders, depression, and several other conditions is partly due to a common genetic vulnerability.[3, 10, 11]

These estimates also leave a substantial role for environmental factors. Twin studies separating the contributions of shared environment (e.g., parental upbringing) from non-shared (i.e., unique friends or hobbies) typically reveal a strong role for non-shared environmental factors, comparable in strength to the genetic component, but only a minor role for shared environment.[3, 5, 12] Recent work is beginning to consider how genetic and environmental factors combine to determine risk. For example, the genetic influence on gambling involvement and problem gambling was greater in people living in disadvantaged neighbourhoods.[13]

Research using molecular genetic techniques has tried to identify specific genes that are involved in developing gambling problems. Two genome-wide association studies have been conducted to date.[14, 15] Both were relatively small studies that did not identify any significant genes after taking into account the millions of genetic sites being tested, but exploratory associations with genes implicated in Parkinson's disease and alcohol dependence were observed.

Other studies have tested for specific gene variants that are implicated from research on the underlying neural systems, such as genes affecting dopamine transmission (see 3.4.2 Neurobiology). This 'candidate gene approach' has shown higher levels of a number of gene variants in groups with gambling problems, including dopamine D1, D2 and D3 receptors,[7, 16-18] as well as genes involved in serotonin transmission, [19] although like much of the field of candidate gene studies, failures to replicate the results have been high. In one of the first gambling studies to consider an epigenetic mechanism, levels of DNA methylation (a process in which gene expression is typically reduced, without changes to the actual DNA sequence) in the dopamine D2 receptor genes were associated with treatment seeking status and length of gambling abstinence in people with gambling problems.[20] Overall, it is likely that harmful gambling is affected by many genes and is also shaped in fundamental ways by the environment, and future epigenetic studies are needed.

3.4.2 NEUROBIOLOGY

Studies comparing groups of problem gamblers and healthy participants have investigated a range of neurocognitive and biological markers of harmful gambling. These studies indicate altered function in the brain system responsible for reward processing, risk-based decision making, and inhibitory control.[21-23]

The evidence from neuropsychological studies is strong: a large number of studies have indicated behavioural markers of impulsivity and impaired decision making (see below). These studies are being conducted with increasingly large groups of pathological gamblers, where sources of diversity and relationships with clinical outcomes are beginning to be identified (e.g., Alvarez-Moya et al.;[24] Goudriaan et al.;[25] and, Kräplin et al.[26]).

The evidence for corresponding biological markers is at an earlier stage, with some notable mixed findings (see below) and a reliance on small groups of problem gamblers that have not allowed investigation of sources of variability. Due to the types of research designs commonly used in neuropsychological research, it is unclear whether the neurobiological changes that have been described reflect pre-existing vulnerability or are the consequence of harmful gambling.

Neurocognitive studies make use of behavioural tasks that have established links to brain function, typically from research on patients with focal brain injury. People with gambling problems show risky decision making on a number of tasks linked to the ventromedial prefrontal cortex[27, 28] (see Kovacs et al.[23] for a systematic review of the Iowa Gambling Task and gambling disorder).

Impulsivity, or the tendency towards rapid or unplanned behaviour, is a construct identified in personality research on harmful gambling (see Section 3.3.1 Personality and Temperament), which can also be examined with neurocognitive tests. People with gambling problems show clear signs of impulsive choice—for example, preferring immediate over delayed rewards on delay discounting tasks.[29-31] Impaired performance on response inhibition ('impulsive action') tasks like the Stop Signal Task is also observed (Chowdhury et al.,[32] systematic review), along with broader deficits in executive function in more severe cases of pathological gambling.[33, 34] Impulsivity during intense mood states ('urgency') is related to difficulties in emotional regulation, which can affect gambling behaviour. Further, people with gambling disorder showed excessive activity in the prefrontal cortex during a task that required emotional reappraisal of unpleasant images.[35]

Functional neuroimaging techniques, primarily functional magnetic resonance imaging (fMRI), have been used to examine brain responses as people with gambling problems perform reward, decision making, and impulse control tasks in the brain scanner. These kinds of tasks activate a brain network in humans, commonly termed the 'brain reward system', which includes the ventral striatum/nucleus accumbens and medial prefrontal cortex, as well as extended circuitry like the dopaminergic midbrain, amygdala, and insula.

fMRI studies in problem gamblers have repeatedly shown changes in these regions compared to healthy control participants,[36-39] although the direction of signal change (i.e., over-activity or under-activity) is not consistent.[22] Similar discrepancies are observed in neuroimaging studies in substance use disorders.[40] Other studies using electroencephalography (EEG) in problem gamblers show a similar pattern of inconsistency between hyper-sensitivity and hypo-sensitivity to winning outcomes.[41, 42]

Activity within this brain reward system may also be shaped by the structural characteristics of gambling games (see Section 2.3.1 Structural Characteristics). For example, near-misses trigger brain responses in the striatum and insula that overlap with those seen in actual wins,[43] and these brain responses are heightened in people with gambling problems.[44, 45]

Neurological patients with focal brain injury to the insula failed to show a behavioural response to near-misses and showed weaker beliefs in the Gambler's Fallacy.[46] Neuroimaging studies have begun to depict how the brain reward system responds to other structural characteristics and cognitive distortions such as illusion of control and winning/losing streaks.[47, 48]

Dopamine is a key neurotransmitter within the brain reward system. It is implicated in problem gambling by a syndrome in Parkinson's disease where problem gambling can arise as a rapid side effect of dopamine agonist medications.[49, 50] Problem gamblers have altered levels of dopamine metabolites in plasma[51] and elevated frequencies of some genetic polymorphisms that affect the dopamine system (Lobo et al.[52]; see Section 3.4.1 Genetic Inheritance).

Positron emission tomography (PET) imaging can be used to measure dopamine transmission in the brain. In contrast to substance use disorders, in which lower levels of both dopamine receptors and dopamine release are described,[53] people with gambling problems appear to show no significant group difference in dopamine receptor levels,[54-56] but do show increased dopamine release in response to either amphetamine challenge or a gambling task.[56-59]

Other neurotransmitters are also implicated. The most promising form of a pharmacotherapy for problem gambling is the opioid receptor antagonist naltrexone, a long-standing treatment for heroin and alcohol dependence. Naltrexone reduced urges to gamble relative to a placebo,[60] although some clinical trials have not replicated this effect (e.g., Kovanen et al.[61] looking at the effects of 'as needed' naltrexone). A family history of alcohol use disorder was a predictor of a beneficial response to naltrexone in clinical studies.[62] In an animal model of risky decision making, the 'rat Gambling Task', naltrexone improved performance in a subset of animals that were deficient on the task at baseline.[63] However, in a PET study that imaged the opioid system in people with gambling disorder, the amount of opioid released in response to a low dose of amphetamine was found to be reduced,[64] and this is difficult to reconcile with the clinical effectiveness of naltrexone as an opioid antagonist. In summary, although some clinical trials have supported the benefits of opioid antagonists, the mechanism of action is not known.

Noradrenaline is another important neurotransmitter that plays a key role in regulating arousal. Abnormalities in noradrenergic transmission could, in principle, predispose some individuals to greater elevations in physiological arousal when gambling (e.g., heart rate, skin conductivity).[65] These peripheral forms of arousal may serve as markers for harmful gambling, but evidence of their reliability is mixed.[66-68] Other work has begun to investigate the serotonin system,[11] which may be particularly relevant to the comorbidity with mood and anxiety disorders.[69] In addition to pharmacological treatments that are informed by these neurobiological findings, recent proof-of-principle studies have begun to examine forms of brain stimulation in gambling disorder, including transcranial magnetic stimulation[70] and direct current stimulation.[71]

REFERENCES

1. Walters GD. Behavior genetic research on gambling and problem gambling: A preliminary meta-analysis of available data. *Journal of Gambling Studies*. 2001;17(4):255-71.

2. Black DW, Monahan PO, Temkit M, Shaw M. A family study of pathological gambling. *Psychiatry Research*. 2006;141(3):295-303. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/a-family-study-of-pathological-gambling

3. Slutske WS, Zhu G, Meier MH, Martin NG. Genetic and environmental influences on disordered gambling in men and women. *Archives of General Psychiatry*. 2010;67(6):624-30.

4. Lobo DSS, Kennedy JL. The genetics of gambling and behavioral addictions. *CNS Spectrums*. 2006;11(12):931-9.

5. Eisen SA, Lin N, Lyons MJ, Scherrer JF, Griffith K, True WR, et al. Familial influences on gambling behavior: An analysis of 3359 twin pairs. *Addiction*. 1998;93(9):1375-84.

6. Shah KR, Eisen SA, Xian H, Potenza MN. Genetic studies of pathological gambling: A review of methodology and analyses of data from the Vietnam Era Twin Registry. *Journal of Gambling Studies*. 2005;21(2):179-203.

7. Lobo DSS. Genetic aspects of gambling disorders: Recent developments and future directions. *Current Behavioral Neuroscience Reports*. 2016;3(1):58-66.

8. Agrawal A, Lynskey MT. Are there genetic influences on addiction: Evidence from family, adoption and twin studies. *Addiction*. 2008;103(7):1069-81.

9. Goldman D, Oroszi G, Ducci F. The genetics of addictions: Uncovering the genes. *Nature Reviews Genetics*. 2005;6(7):521-32.

10. Xian H, Giddens JL, Scherrer JF, Eisen SA, Potenza MN. Environmental factors selectively impact co-occurrence of problem/pathological gambling with specific drug-use disorders in male twins. *Addiction*. 2014;109(4):635-44.

11. Potenza MN, Walderhaug E, Henry S, Gallezot JD, Planeta-Wilson B, Ropchan J, et al. Serotonin 1B receptor imaging in pathological gambling. *World Journal of Biological Psychiatry*. 2013;14(2):139-45.

12. Vitaro F, Hartl AC, Brendgen M, Laursen B, Dionne G, Boivin M. Genetic and environmental influences on gambling and substance use in early adolescence. *Behavior Genetics*. 2014;44(4):347-55.

13. Slutske WS, Deutsch A, Statham D, Martin NG. Local area disadvantage and gambling involvement and disorder: evidence for gene-environment correlation and interaction. *Journal of Abnormal Psychology*. 2015;124(3):606-22. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/gambling-involvement-and-disorder-influence-genetics-and-environment

14. Lind PA, Zhu G, Montgomery GW, Madden PAF, Heath AC, Martin NG, et al. Genome-wide association study of a quantitative disordered gambling trait. *Addiction Biology*. 2013;18(3):511-22.

15. Lang M, Lemenager T, Streit F, Fauth-Buhler M, Frank J, Juraeva D, et al. Genome-wide association study of pathological gambling. *European Psychiatry*. 2016;36:38-46. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/understanding-genetic-causes-pathological-gambling

16. Comings DE, Rosenthal RJ, Lesieur HR, Rugle LJ, Muhleman D, Chiu C, et al. A study of the dopamine D2 receptor gene in pathological gambling. *Pharmacogenetics*. 1996;6(3):223-34.

17. Lobo DS, Kennedy JL. Genetic aspects of pathological gambling: A complex disorder with shared genetic vulnerabilities. *Addiction*. 2009;104(9):1454-65.

18. Lobo DSS, Aleksandrova L, Knight J, Casey DM, El-Guebaly N, Nobrega JN, et al. Addiction-related genes in gambling disorders: New insights from parallel human and pre-clinical models. *Molecular Psychiatry*. 2015;20(8):1002-10.

19. Wilson D, Lobo D, Tavares H, Gentil V, Vallada H. Family-based association analysis of serotonin genes in pathological gambling disorder: evidence of vulnerability risk in the 5HT-2A receptor gene. *Journal of Molecular Neuroscience*. 2013;49(3):550-53.

20. Hillemacher T, Frieling H, Buchholz V, Hussein R, Bleich S, Meyer C, et al. Alterations in DNA-methylation of the dopamine-receptor 2 gene are associated with abstinence and health care utilization in individuals with a lifetime history of pathologic gambling. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*. 2015;63(3):30-4.

21. Leeman RF, Potenza MN. Similarities and differences between pathological gambling and substance use disorders: A focus on impulsivity and compulsivity. *Psychopharmacology*. 2012;219(2):469-90.

22. Limbrick-Oldfield EH, van Holst RJ, Clark L. Fronto-striatal dysregulation in drug addiction and pathological gambling: Consistent inconsistencies? *Neuroimage: Clinical*. 2013;2(1):385-93.

23. Kovacs I, Richman MJ, Janka Z, Maraz A, Ando B. Decision making measured by the Iowa Gambling Task in alcohol use disorder and gambling disorder: a systematic review and meta-analysis. *Drug Alcohol Dependence*. 2017;181:152-61.

24. Alvarez-Moya EM, Ochoa C, Jimenez-Murcia S, Aymami MN, Gomez-Pena M, Fernandez-Aranda F, et al. Effect of executive functioning, decision making and self-reported impulsivity on the treatment outcome of pathologic gambling. *Journal of Psychiatry and Neuroscience*. 2011;36(3):165-75.

25. Goudriaan AE, Oosterlaan J, De Beurs E, Van Den Brink W. The role of self-reported impulsivity and reward sensitivity versus neurocognitive measures of disinhibition and decision making in the prediction of relapse in pathological gamblers. *Psychological Medicine*. 2008;38(1):41-50.

26. Kräplin A, Dshemuchadse M, Behrendt S, Scherbaum S, Goschke T, Buhringer G. Dysfunctional decision making in pathological gambling: Pattern specificity and the role of impulsivity. *Psychiatry Research*. 2014;215(3):675-82.

27. Brevers D, Cleeremans A, Goudriaan AE, Bechara A, Kornreich C, Verbanck P, et al. Decision making under ambiguity but not under risk is related to problem gambling severity. *Psychiatry Research*. 2012;200(2-3):568-74.

28. Lawrence AJ, Luty J, Bogdan NA, Sahakian BJ, Clark L. Problem gamblers share deficits in impulsive decision making with alcohol-dependent individuals. *Addiction*. 2009;104(6):1006-15.

29. Dixon MR, Jacobs EA, Sanders S. Contextual control of delay discounting by pathological gamblers. *Journal of Applied Behavior Analysis*. 2006;39(4):413-22.

30. Michalczuk R, Bowden-Jones H, Verdejo-Garcia A, Clark L. Impulsivity and cognitive distortions in pathological gamblers attending the UK National Problem Gambling Clinic: A preliminary report. *Psychological Medicine*. 2011;41(12):2625-35.

31. Petry NM. Pathological gamblers, with and without substance abuse disorders, discount delayed rewards at high rates. *Journal of Abnormal Psychology*. 2001;110(3):482-7.

32. Chowdhury NS, Livesey EJ, Blaszczynski A, Harris JA. Pathological gambling and motor impulsivity: A systematic review with meta-analysis. *Journal of Gambling Studies*. 2017;33(4):1213-39. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/reviewing-evidence-of-motor-impulsivity-in-pathological-gambling

33. Forbush KT, Shaw M, Graeber MA, Hovick L, Meyer VJ, Moser DJ, et al. Neuropsychological characteristics and personality traits in pathological gambling. *CNS Spectrums*. 2008;13(4):306-15.

34. Leiserson V, Pihl RO. Reward-sensitivity, inhibition of reward-seeking, and dorsolateral prefrontal working memory function in problem gamblers not in treatment. *Journal of Gambling Studies*. 2007;23(4):435-55.

35. Navas JF, Contreras-Rodriguez O, Verdejo-Roman J, Perandres-Gomez A, Albein-Urios N, Verdejo-Garcia A, et al. Trait and neurobiological underpinnings of negative emotion regulation in gambling disorder. *Addiction*. 2017;112(6):1086-94. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/gambling-disorder-is-associated-with-the-use-of-suppression-to-cope-with-negative

36. Balodis IM, Kober H, Worhunsky PD, Stevens MC, Pearlson GD, Potenza MN. Diminished frontostriatal activity during processing of monetary rewards and losses in pathological gambling. *Biological Psychiatry*. 2012;71(8):749-57.

37. Reuter J, Raedler T, Rose M, Hand I, Glascher J, Buchel C. Pathological gambling is linked to reduced activation of the mesolimbic reward system. *Nature Neuroscience*. 2005;8(2):147-8.

38. Miedl SF, Peters J, Buchel C. Altered neural reward representations in pathological gamblers revealed by delay and probability discounting. *Archives of General Psychiatry*. 2012;69(2):177-86.

39. van Holst RJ, Veltman DJ, Buchel C, van den Brink W, Goudriaan AE. Distorted expectancy coding in problem gambling: Is the addictive in the anticipation? *Biological Psychiatry*. 2012;71(8):741-8.

40. Leyton M, Vezina P. Striatal ups and downs: Their roles in vulnerability to addictions in humans. *Neuroscience and Biobehavioral Reviews*. 2013;37(9):1999-2014.

41. Hewig J, Kretschmer N, Trippe RH, Hecht H, Coles MG, Holroyd CB, et al. Hypersensitivity to reward in problem gamblers. *Biological Psychiatry*. 2010;67(8):781-3.

42. Lole L, Gonsalvez CJ, Barry RJ. Reward and punishment hyposensitivity in problem gamblers: A study of event-related potentials using a principal components analysis. *Clinical Neurophysiology*. 2015;126(7):1295-309.

43. Clark L, Lawrence AJ, Astley-Jones F, Gray N. Gambling near-misses enhance motivation to gamble and recruit win-related brain circuitry. *Neuron*. 2009;61(3):481-90.

44. Sescousse G, Janssen LK, Hashemi MM, Timmer MH, Geurts DE, Ter Huurne NP, et al. Amplified striatal responses to near-miss outcomes in pathological gamblers. *Neuropsychopharmacology*. 2016;41(10):2614-23.

45. Dymond S, Lawrence NS, Dunkley BT, Yuen KS, Hinton EC, Dixon MR, et al. Almost winning: Induced MEG theta power in insula and orbitofrontal cortex increases during gambling near-misses and is associated with BOLD signal and gambling severity. *Neuroimage*. 2014;91:210-9.

46. Clark L, Studer B, Bruss J, Tranel D, Bechara A. Damage to insula abolishes cognitive distortions during simulated gambling. *Proceedings of the National Academy of Sciences of the United States of America*. 2014;111(16):6098-103.

47. Akitsuki Y, Sugiura M, Watanabe J, Yamashita K, Sassa Y, Awata S, et al. Context-dependent cortical activation in response to financial reward and penalty: An event-related fMRI study. *Neuroimage*. 2003;19(4):1674-85.

48. Kool W, Getz SJ, Botvinick MM. Neural representation of reward probability: Evidence from the illusion of control. *Journal of Cognitive Neuroscience*. 2013;25(6):852-61.

49. Weintraub D, Koester J, Potenza MN, Siderowf AD, Stacy M, Voon V, et al. Impulse control disorders in Parkinson disease: A cross-sectional study of 3090 patients. *Archives of Neurology*. 2010;67(5):589-95.

50. Olley J, Blaszczynski A, Lewis S. Dopaminergic Medication in Parkinson's Disease and Problem Gambling. *Journal of Gambling Studies*. 2015;31(3):1085-106.

51. Bergh C, Eklund T, Södersten P, Nordin C. Altered dopamine function in pathological gambling. *Psychological Medicine*. 1997;27(2):473-5.

52. Lobo DSS, Aleksandrova L, Knight J, Casey DM, el-Guebaly N, Nobrega JN, et al. Addiction-related genes in gambling disorders: New insights from parallel human and pre-clinical models. *Molecular Psychiatry*. 2014;20:1002.

53. Volkow ND, Fowler JS, Wang GJ, Swanson JM, Telang F. Dopamine in drug abuse and addiction: Results of imaging studies and treatment implications. *Archives of Neurology*. 2007;64(11):1575-9.

54. Boileau I, Payer D, Chugani B, Lobo D, Behzadi A, Rusjan PM, et al. The D2/3 dopamine receptor in pathological gambling: A positron emission tomography study with [11C]-(+)-propyl-hexahydro-naphtho-oxazin and [11C]raclopride. *Addiction*. 2013;108(5):953-63.

55. Clark L, Stokes PR, Wu K, Michalczuk R, Benecke A, Watson BJ, et al. Striatal dopamine D(2)/D(3) receptor binding in pathological gambling is correlated with mood-related impulsivity. *Neuroimage*. 2012;63(1):40-6.

56. Linnet J, Moller A, Peterson E, Gjedde A, Doudet D. Dopamine release in ventral striatum during Iowa gambling task performance is associated with increased excitement levels in pathological gambling. *Addiction*. 2011;106(2):383-90.

57. Boileau I, Payer D, Chugani B, Lobo DSS, Houle S, Wilson AA, et al. In vivo evidence for greater amphetamine-induced dopamine release in pathological gambling: A positron emission tomography study with [11 C]-(+)-PHNO. *Molecular Psychiatry*. 2014;19(12):1305-13.

58. Joutsa J, Johansson J, Niemela S, Ollikainen A, Hirvonen MM, Piepponen P, et al. Mesolimbic dopamine release is linked to symptom severity in pathological gambling. *Neuroimage*. 2012;60(4):1992-9.

59. Linnet J, Moller A, Peterson E, Gjedde A, Doudet D. Dopamine release in ventral striatum during Iowa Gambling Task performance is associated with increased excitement levels in pathological gambling. *Addiction*. 2011;106(2):383-90.

60. Kim SW, Grant JE, Adson DE, Shin YC. Double-blind naltrexone and placebo comparison study in the treatment of pathological gambling. *Biological Psychiatry*. 2001;49(11):914-21.

61. Kovanen L, Basnet S, Castren S, Pankakoski M, Saarikoski ST, Partonen T, et al. A randomised, double-blind, placebo-controlled trial of as-needed naltrexone in the treatment of pathological gambling. *European Addiction Research*. 2016;22(2):70-9. Plain language summary available at http://www.greo.ca/Modules/EvidenceCentre/Details/clinical-trial-naltrexone-treatment-pathological-gambling-finland

62. Grant JE, Kim SW, Hollander E, Potenza MN. Predicting response to opiate antagonists and placebo in the treatment of pathological gambling. *Psychopharmacology Series - Berlin*. 2008;200(4):521-7.

63. Di Ciano P, Le Foll B. Evaluating the impact of naltrexone on the rat Gambling Task to test Its predictive validity for gambling disorder. *PLoS One*. 2016;11(5):e0155604.

64. Mick I, Myers J, Ramos AC, Stokes PRA, Erritzoe D, Colasanti A, et al. Blunted endogenous opioid release following an oral amphetamine challenge in pathological gamblers. *Neuropsychopharmacology*. 2016;41(7):1742-50.

65. Pallanti S, Bernardi S, Allen A, Chaplin W, Watner D, DeCaria CM, et al. Noradrenergic function in pathological gambling: Blunted growth hormone response to clonidine. *Journal of Psychopharmacology*. 2010;24(6):847-53.

66. Diskin KM, Hodgins D. Psychophysiological and arousal during gambling in pathological and non-pathological video lottery gamblers. *International Gambling Studies*. 2003;3(1):37-51.

67. Moodie C, Finnigan F. A comparison of the autonomic arousal of frequent, infrequent and non-gamblers while playing fruit machines. *Addiction*. 2005;100(1):51-9.

68. Yucha C, Bernhard B, Prato C. Physiological effects of slot play in women. *Applied Psychophysiology and Biofeedback*. 2007;32(3-4):141-7.

69. Hollander E, DeCaria CM, Finkell JN, Begaz T, Wong CM, Cartwright C. A randomized double-blind fluvoxamine/placebo crossover trial in pathologic gambling. *Biological Psychiatry*. 2000;47(9):813-7.

70. Zack M, Cho SS, Parlee J, Jacobs M, Li C, Boileau I, et al. Effects of high frequency repeated transcranial magnetic stimulation and continuous theta burst stimulation on gambling reinforcement, delay discounting, and stroop interference in men with pathological gambling. *Brain Stimulation*. 2016;9(6):867-75.

71. Dickler M, Lenglos C, Renauld E, Ferland F, Edden RA, Leblond J, et al. Online effects of transcranial direct current stimulation on prefrontal metabolites in gambling disorder. *Neuropharmacology*. 2018;131:51-7.

4. Summary of Existing Research that Informed Our Work

The Conceptual Framework draws upon knowledge and insights gained from past models and theories that have contributed to gambling research. Summarized below are the relevant points of several key models and theories to outline their contributions to the field. Most of the summaries are of analytical models of behaviour, as well as policy and responsible gambling frameworks that are well recognized.

Pathway model of problem and pathological gambling.[1] This is likely the most well-known, comprehensive model for problem gambling. The model identifies three distinct subgroups of problem gamblers: behaviourally conditioned, emotionally vulnerable, and antisocial impulsivists. These subgroups develop problems in different ways, which are outlined in specific sub-models, as well as in an integrated model. The integrated model contains approximately 25 factors, most of which are psychological and biological, such as impulsivity, depression, subjective excitement, substance abuse, and irrational beliefs. There are also two ecological factors–increased availability and increased accessibility–which, at a basic level, causally influence the other factors.

Impulsivity and pathological gambling.[2] This descriptive model predicts that dysfunctional impulsivity is the cause of some peoples' gambling problems. It assumes the presence of several influencing psycho-biological factors and a cyclical process involving impulsivity, gambling behaviour, subjective and behavioural reinforcement, affective interpretation, and cognitions. The reinforcing factors include social rewards gained in gambling environments.

Cognitive-behavioural model of problem gambling.[3, 4] This model adopts a bio-psychosocial perspective, and is based on a review of major research findings in the gambling field. It brings together these distinct research areas, and examines approximately 25 biological, psychological, and social factors that contribute to gambling problems. It is an empirically derived model that is intended to encourage research into both individual factors as well as the interactions between different variables.

Biopsychosocial model of pathological gambling.[5] This psychosocial model outlines causal and mediating relationships. It is composed of eight steering components, each of which have sub-factors. The steering components are: potentiating variables; antecedents; beliefs; alternative behaviours; capability; consequences; as well as cultural components such as identity, spirituality, and values. While most of the factors in this model are psychological, it also examines social factors such as availability of gambling and reinforcement of gambling behaviour through various interpersonal relationships.

Psycho-structural cybernetic model, feedback and problem gambling.[6] This model is based on approximately 10 biological and psychological factors that lead to gambling problems. It proposes that problem gambling behaviour is generated by the interaction between two mechanisms. The first is located within the person, comprising psychology

and biology. The second is external and structural, taking into consideration culture, economic disparity, community structure, political/public health policy, and broadcast agents. The interaction between the two mechanisms is assumed to be a complex feedback process in which social knowledge is created and incorporated in the person's behaviour.

Bio-psycho-social-sociological model.[7] This treatment model includes biological, psychological, and social factors that influence involvement in gambling. The factors are linked together by an overarching concept referred to as sociological imagination, which is suggested as a key to better treatment. In this model, excessive gamblers are made aware of societal influences on their gambling problems—rather than having them believe that their problems result from individual pathology or weak character. Awareness of the commercial principles of the gaming market and the politics of gambling regulation is assumed to aid treatment. Consequently, this increases a person's chances of recovery or of altering his or her gambling behaviour towards less harmful patterns.

Alberta Longitudinal Project.[8] A conceptual model of important causal factors in the development of gambling involvement and gambling problems was outlined for the Alberta longitudinal study (titled the Leisure, Lifestyle, Lifecycle Project - LLLP). The LLLP conceptual model was used to determine the constructs measured in this five-year study that assessed the same participants at four time points. The model includes many of the factors identified in the present document, such as family history, biological, cognitive, personality influences, family and social environment, and life stressors. The model acknowledges the influence of the broader social and cultural context (e.g., laws, public attitudes) and the relationship between gambling and other addictive and mental health disorders.

Etiological Framework for Problem Gambling.[9] There are various ways to measure and organize the factors involved in the development of problem gambling. While this framework contains all the same factors as the conceptual framework, it organizes them in different ways. In recognition that fifty percent of the propensity for developing problem gambling can be predicted by genetic factors, the Etiological Framework for Problem Gambling has two areas of focus: biological and environmental. Within these areas, factors that both increase and decrease the risk of problem gambling are identified.

Public Health Framework.[10, 11] This approach broadly addresses healthy public policy, comprehensive notions of prevention, and broad community engagement. It uses a range of scientific approaches, diverse perspectives and social determinants, including: epidemiology, social marketing, economics, community development, education, family functioning, socioeconomic status, and ethno-cultural diversities. This framework aims to guide public policy by preventing or reducing harm; promoting balanced and responsible choices; and protecting vulnerable and at-risk populations. It also recognizes that there are both costs and benefits associated with gambling.[11] A public health framework was used by Abbott, Volberg, Bellringer, and Reith[10] to conceptualize and integrate research on problem gambling development and related harms. It distinguishes between the agent (availability and exposure to gambling activities); the host (individual attributes and experiences that increase susceptibility and resistance to problem development); and the environment (the wider physical, social, and cultural setting within which gambling occurs). It also considers interactions between the three domains with regard to problem/harm development, resistance/adaptation, and policy and other measures to reduce or prevent harmful gambling.

REFERENCES

1. Blaszczynski A, Nower L. A pathways model of problem and pathological gambling. *Addiction*. 2002;97(5):487-99.

2. Nower L, Blaszczynski A. Impulsivity and pathological gambling: A descriptive model. *International Gambling Studies*. 2006;6:61-75.

3. Sharpe L, Tarrier N. Towards a cognitive-behavioural theory of problem gambling. *The British Journal of Psychiatry*. 1993;162(3):407-12.

4. Sharpe L. A reformulated cognitive–behavioral model of problem gambling: A biopsychosocial perspective. *Clinical Psychology Review*. 2002.

5. Ajdahi S, Wolgast M. *Biopsykosocial modell för spelmissbruk [A biopsychosocial model for problem gambling: A literature review]*. Östersund, Sweden: Swedish National Institute of Public Health; 2008.

6. Zangeneh M, Haydon E. The psycho-structural cybernetic model, feedback, and problem gambling: A new theoretical approach. *eCOMMUNITY: International Journal of Mental Health and Addiction*. 2004;1(2):25-31.

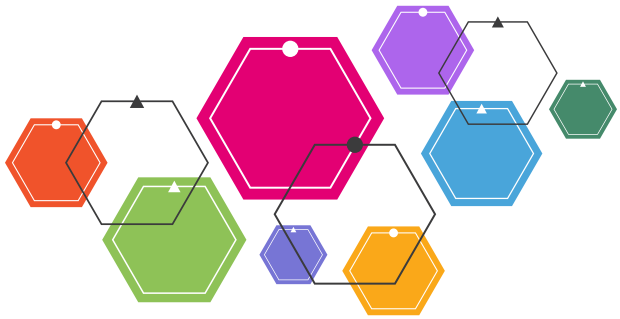
7. Bernhard BJ. Sociological speculations on treating problem gamblers: A clinical sociological imagination via a bio-psycho-social-sociological model. *American Behavioral Scientist*. 2007;51(1):122-38.

8. el-Guebaly N, Casey DM, Hodgins DC, Smith GJ, Williams RJ, Schopflocher DP, et al. Designing a longitudinal cohort study of gambling in Alberta: Rationale, methods, and challenges. *Journal of Gambling Studies*. 2008;24(4):479-504.

9. Williams RJ, West BL, Simpson RI. Prevention of problem and pathological gambling: A comprehensive review of the evidence. Guelph, ON: Gambling Research Exchange Ontario; 2008. Available from: https://www.uleth.ca/dspace/bitstream/handle/10133/414/2008-Prevention-OPGRC.pdf?sequence=7.

10. Abbott M, Volberg R, Bellringer M, Reith G. A review of research on aspects of problem gambling. London, UK: Responsibility in Gambling Trust; 2004.

11. Korn DA, Shaffer HJ. Gambling and the health of the public: Adopting a public health perspective. *Journal of Gambling Studies*. 1999;15(4):289-365.



5. Longitudinal Cohort Studies

Cohort studies are a specific type of study used to investigate the causes of disease and to establish links between risk factors and health outcomes. A cohort study examines a group of people with a shared experience (e.g., exposure to an increase in gambling opportunities) at intervals over time. There are two main types of cohort studies. 'Retrospective' cohort studies look at data that already exist and try to identify risk factors for particular conditions. While retrospective cohort studies tend to be less costly, interpretation of results can be limited due to missing data. 'Prospective' cohort studies are typically planned far in advance and conducted over an extended period of time.

Researchers began conducting prospective cohort studies of gambling and problem gambling in the early 1990s. These early studies involved relatively small groups of people. They had a number of other limitations, including restrictive demographics, a short time span or small number of assessments, looking at either gambling or problem gambling but not both, a short questionnaire that examined only a subset of variables potentially involved in the development (or, 'etiology') of problem gambling, and poor retention rates. Several reviews of these studies have been published.[1-4]

The limitations of these smaller studies led to the launch of several large-scale longitudinal cohort studies of gambling and problem gambling in five countries. These are described below, followed by a brief summary of the factors most consistently linked to future problem gambling among all the studies.

The Leisure, Lifestyle, Lifecycle Project (LLLP) was funded by the Alberta Gambling Research Institute and launched in 2006. A cohort of 1,808 Albertans was recruited with representative sampling from the major regions of the province. Five age cohorts were established at baseline (13–15; 18–20; 23–25; 43–45; 63–65) with equal numbers in each group. The sample included a subset of 524 "high risk" individuals presumed to be at higher risk for developing gambling problems because of their greater expenditure and frequency of gambling. All participants received a comprehensive 2–3 hour assessment of all variables of etiological relevance to gambling and problem gambling at each wave of the study. The LLLP had a 19–21 month interval between assessments. A total of 1,030 adults completed the fourth and final assessment, for an overall retention rate of 76.1%. A total of 313 adolescents completed the fourth and final assessment, for a retention rate of 71.8%. A final report on the results of the LLLP was published in 2015.[5]

The Quinte Longitudinal Study (QLS) was funded by the Ontario Problem Gambling Research Centre and also launched in 2006. A total of 4,123 Ontario adults aged 17–90 were recruited from the Quinte region in Ontario, Canada. A subset of 1,216 "high risk" individuals at elevated risk for developing gambling problems by virtue of their greater expenditure on gambling, past-year gambling on slot machines or horse races, or an intention to gamble at a proposed slots-at-racetrack facility, was included in the sample. All participants received a comprehensive 1–2 hour assessment of all variables of etiological relevance to gambling and problem gambling at each wave of the study. The QLS had five assessment periods, with a 12-month interval between

the start of each period, and a five-month assessment window. The final assessment period ended in 2011. An exceptionally high retention rate of 93.9% was attained in the QLS. A report summarizing the results of the QLS and comparing these with the LLLP was published in 2015.[4]

The Swedish Longitudinal Gambling Study (Swelogs) was funded by the Public Health Agency of Sweden and launched in 2008. The study began in 2008/2009 with an extensive telephone prevalence survey of gambling, problem gambling, and health in a random sample from the Swedish Register of the Total Population aged 16–84 stratified by gender, age, and risk for problem gambling. Those not reached by telephone received a postal survey that was followed up with a reminder. A total of 8,165 of the initial sample of 15,000 responded. Register data on sociodemographics from national registers was added to the response data and also used to calculate survey weights. Follow-up assessments of the 8,165 Swedes occurred in 2009/10 with 6021 participants, in 2012 with 4,188 participants, and finally in 2014 with 3,559 participants. A total of 2,847 individuals participated in all four waves. A separate track used a case control design whereby all moderate risk and problem gamblers in the epidemiological track of the study and a sample of low-risk and non-problem gamblers (identified using the CPGI) were selected for interviews. Each moderate risk and problem gambler was matched on basic demographics with three people selected from the general population sample to form a control group. This in-depth track included comprehensive telephone interviews completed in 2011 with 2400 participants, again in 2013, and a third qualitative wave completed 2015. A final feature of the study is a follow up of 578 people from a 1997/1998 Swedish gambling prevalence study (289 problem gamblers and a matched set of controls). There is a report for wave one and wave two, and several fact sheets describing the results, available in English at www.folkhalsomyndigheten.se.

The Swelogs research team has published four articles in English: (1) describing the study methodology,[6] (2) comparing the results of the 1997/1998 prevalence survey in Sweden with the Swelogs baseline epidemiological survey in 2009,[7] (3) examining problem gambling prevalence and incidence in Sweden,[8] and (4) identifying the riskiness of different forms of gambling in Sweden.[9] Data was also used in two doctoral theses, each with four articles that were also published separately.

The Victorian Gambling Study (VGS) was funded by the Victoria Department of Justice in Australia and launched in 2008. The study began with a general population survey of gambling behaviour and health among 15,000 adults in Victoria, with oversampling of local government areas that showed higher EGM expenditure. There were three subsequent waves roughly 12 months apart in 2009, 2010, and 2011. The retention rate at the end of the study was 24.7%. The assessment consisted of a minute telephone interview focusing on gambling behaviour, health and well-being, important life events in the past 12 months, and demographic information. Reports on the results of the VGS have been published by the Victoria Department of Justice[10, 11] and the Victorian Responsible Gambling Foundation.[12-14] Four technical reports with additional analyses of the VGS[15-18] are also freely available from the Victorian Responsible Gambling Foundation.

The New Zealand National Gambling Study (NZ NGS) is funded by the New Zealand Ministry of Health and began in 2012. The study started with a face-to-face prevalence survey of gambling and problem gambling among 6,251 people aged 18 years and older living in private households. This study oversamples important ethnic groups in the country, including Māori, Pacific people, and Asian people. The assessment consisted of a 45-60 minute structured interview focusing on gambling behaviour, problem gambling, life events, mental health, alcohol and substance use and misuse, health

conditions, social connectedness, level of deprivation, and demographics. The NZ NGS has had four assessment periods from 2012 to 2015, with a 12-month interval between the start of each period. Reports and articles on the results of each wave of the study are available online.[19-25] A further cohort of 106 high risk gamblers was recruited from gambling venues and via advertisements in 2014/15, and re-assessed in 2015/16, with the purpose of assessing their similarity to the NGS high risk gamblers for potential sample combination, thereby increasing statistical power for sub-group analyses. In 2018, a sub-sample of 50 participants is taking part in semi-structured interviews to understand how, and why, people transition between different gambling states.

The Massachusetts Gambling Impact Cohort study (MAGIC), funded by the Massachusetts Gaming Commission, is the first U.S. large-scale adult cohort study of gambling and problem gambling. The goals of the MAGIC study are to determine the incidence of problem gambling (i.e., rate of new cases) both prior to and after the introduction of casinos in Massachusetts, determine the stability and transitions associated with problem gambling, and develop a full etiological model of problem gambling. The cohort was established with a stratified sample of 3,139 participants who had completed the baseline prevalence survey in Massachusetts.[26] The main purpose of the stratified sample was to ensure that the cohort included the largest possible number of "high-risk" individuals who might be expected to change their gambling status over the course of the study. The cohort was established in 2015 and subsequent waves of data collection were completed in 2016 and 2018. At least one more wave of data collection is planned in 2019 and there are plans to refresh the cohort in 2020 following a second large general population prevalence survey. Reports on the results of the 2015 and 2016 waves of the MAGIC study are available online.[26, 27]

Some consistent findings emerge from the full body of longitudinal studies of gambling and problem gambling.[4] First, gambling categorization is surprisingly unstable, with people moving into and out of problem or at-risk gambling status over time. In general, recreational gamblers and non-gamblers tend to be most stable over time. Less than half of people with gambling problems tend to have a gambling problem in the next assessment period, and only a small minority of problem gamblers remain in this status over multiple consecutive assessments. Another consistent finding from the longitudinal studies is that no single variable is overwhelmingly present in people who develop gambling problems and absent in those who do not. Instead, there are many different variables that increase the risk of future problem gambling. This is consistent with what has been found in other areas of addiction.

There are some factors that are much stronger predictors than others of future problem gambling. In general, gambling-related variables most strongly predict future problem gambling. Specifically, future problem gambling is best predicted by currently being a problem gambler, followed by being in the at-risk category. The latter variable is primarily associated with the continuation of problem gambling, as well as relapse, rather than being implicated in the onset of problem gambling.

Other strong gambling-related predictors of future problem gambling include a big gambling win in the past year, intensity of overall gambling involvement, higher frequency of involvement in continuous forms of gambling (e.g., EGMs), rating gambling as an important leisure activity, having family members and/or close friends who gamble heavily, gambling to escape or distract oneself, higher levels of gambling fallacies, and shorter distance to the nearest EGM venue.

Personality is the next most important category of variables that predict future problem gambling. Particularly important traits include impulsivity, vulnerability to stress, lower agreeableness, and lower conscientiousness. These personality traits have not been assessed in all of the prospective cohort studies; still, this profile is consistent with the personality profile of people with gambling problems that seek treatment, as well as people with gambling problems drawn from community samples. These traits are also commonly found in people who abuse substances.

The third category of variables associated with future problem gambling includes mental health problems. Depression has long been known to be a strong correlate of problem gambling and it is the second most commonly identified predictor of problem gambling across the large prospective cohort studies. Having any mental health disorder has also been found to be a consistent predictor of future problem gambling, as have behavioral addictions and substance abuse (including tobacco use).

When these variables are included in multivariate models, the complexity of future problem gambling becomes even more apparent. Even after eliminating variables with overlapping predictive power, there are still many variables that predict future problem gambling. In multivariate approaches, gambling category is again the strongest individual predictor, but the individual gambling variables lose some predictive power. Beyond the gambling-related variables, the only variables that robustly add predictive power to multivariate results are impulsivity, having a behavioral addiction, having a lifetime history of addiction to drugs or alcohol, and having a family history of mental health problems.

An important finding from the longitudinal cohort studies is that different variables predict the first onset of problem gambling versus relapse and the continuation of problem gambling. Almost all of the gambling-related predictors tend to be first onset predictors. In contrast, non-gambling variables have a greater role in problem gambling continuation and relapse. In particular, the presence of certain personality traits as well as comorbid mental health disorders, a lifetime history of mental health or substance abuse problems, lower intellectual ability, and anti-sociality make it more difficult for people with gambling problems to recover and leave them more susceptible to relapse once they have recovered.

REFERENCES

1. Abbott MW, Clarke D. Prospective problem gambling research: Contribution and potential. *International Gambling Studies*. 2007;7(1):123-44.

2. Slutske W. Longitudinal studies of gambling behavior. In: Smith G, Hodgins D, Williams R, editors. *Research and Measurement Issues in Gambling Studies*. London, UK: Elsevier; 2007. p. 127-54.

3. el-Guebaly N, Casey DM, Hodgins DC, Smith GJ, Williams RJ, Schopflocher DP, et al. Designing a longitudinal cohort study of gambling in Alberta: Rationale, methods, and challenges. *Journal of Gambling Studies*. 2008;24(4):479-504.

4. Williams RJ, Hann R, Schopflocher D, West B, McLaughlin P, White N, et al. Quinte Longitudinal Study of gambling and problem gambling: Report prepared for the Ontario Problem Gambling Research Centre. Guelph, ON2015. Available from: http://www.greo.ca/Modules/EvidenceCentre/files/Williams%20et%20al%20%282015%29Quinte_longitudinal_study_of_gambling_and_PG.pdf.

5. el-Guebaly N, Casey DM, Currie SR, Hodgins DC, Schopflocher DP, Smith GJ, et al. The Leisure, Lifestyle, and Lifecycle Project (LLLP): A longitudinal study of gambling in Alberta. Final report. Calgary, AB: Alberta Gambling Research Institute; 2015. Available from: https://prism.ucalgary.ca/handle/1880/50377.

6. Romild U, Volberg R, Abbott M. The Swedish Longitudinal Gambling Study (Swelogs): Design and methods of the epidemiological (EP-) track. *International Journal of Methods in Psychiatric Research*. 2014;23(3):372-86.

7. Abbott MW, Romild U, Volberg RA. Gambling and problem gambling in Sweden: Changes between 1998 and 2009. *Journal of Gambling Studies*. 2014;30(4):985-99.

8. Abbott M, Romild U, Volberg R. The prevalence, incidence, and gender and age-specific incidence of problem gambling: results of the Swedish longitudinal gambling study (Swelogs). *Addiction*. 2017;113(4):699-707.

9. Binde P, Romild U, Volberg RA. Forms of gambling, gambling involvement and problem gambling: Evidence from a Swedish population survey. *International Gambling Studies*. 2017;17(3):490-507.

10. Victoria Department of Justice. A study of gambling in Victoria: Problem gambling from a public health perspective. Melbourne, Australia: Victoria Department of Justice; 2009. Available from: http://www.greo.ca/Modules/EvidenceCentre/Details/study-gambling-victoria-problem-gambling-public-health-perspective

11. Victorian Department of Justice. The Victorian Gambling Study: A longitudinal study of gambling and public health - Wave Two findings. Melbourne, Australia: Victoria Department of Justice; 2011, June. Available from: http://www.greo.ca/Modules/EvidenceCentre/Details/victorian-gambling-study-longitudinal-study-gambling-and-public-health-wave-two-findings

12. Victorian Responsible Gambling Foundation. The Victorian Gambling Study: A longitudinal study of gambling and public health, Wave Three findings. Melbourne, Australia: Victorian Responsible Gambling Foundation; 2011, November. Available from: https://responsiblegambling.vic.gov.au/documents/84/Research-report-vic-gambling-study-wave-three-findings.pdf

13. Victorian Responsible Gambling Foundation. The Victorian Gambling Study: Qualitative component: Report of findings from qualitative interviews. Melbourne, Australia: Victorian Responsible Gambling Foundation; 2012, November. Available from: https://www.austgamingcouncil.org.au/sites/default/files/Victorian%20Gambling%20Study%20-%20Qualitative%20Component%20Report.pdf.

14. Billi R, Stone CA, Marden P, Yeung K. The Victorian Gambling Study: A longitudinal study of gambling and health in Victoria, 2008-2012. Victoria, Australia: Victorian Responsible Gambling Foundation; 2014. Available from: https://responsiblegambling.vic.gov.au/resources/publications/the-victorian-gambling-study-a-longitudinal-study-of-gambling-and-health-in-victoria-20082012-77/.

15. Stone C, Yeung K, Billi R. The Victorian Gambling Study: a longitudinal study of gambling and health in Victoria 2008-2012, Technical report one - Social determinants and co-morbidities: social determinants and co-morbidities of gamblers and non-gamblers. Melbourne, Australia: Victorian Responsible Gambling Foundation; 2016. Available from: https://responsiblegambling.vic.gov.au/documents/136/Victorian_gambling_study_technical_report_one_Jan_2016.pdf.

16. Stone C, Yeung K, Billi R. The Victorian Gambling Study: a longitudinal study of gambling and health in Victoria 2008-2012, Technical report two - Social determinants and co-morbidities: univariate analysis of gamblers. Melbourne, Australia: Victorian Responsible Gambling Foundation; 2016. Available from: https://responsiblegambling.vic.gov.au/documents/137/Victorian_gambling_study_technical_report_two_Jan_2016.pdf.

17. Stone C, Yeung K, Billi R. The Victorian Gambling Study: a longitudinal study of gambling and health in Victoria 2008-2012, Technical report three - Social determinants and co-morbidities: multivariate models of trauma and social capital. Melbourne, Australia: Victorian Responsible Gambling Foundation; 2016. Available from: https://responsiblegambling.vic.gov.au/documents/138/Victorian_gambling_study_technical_report_three_Jan_2016.pdf.

18. Stone C, Yeung K, Billi R. The Victorian Gambling Study: a longitudinal study of gambling and health in Victoria 2008-2012, Technical report four - Social determinants and co-morbidities: multivariate models of co-morbidities. Melbourne, Australia: Victorian Responsible Gambling Foundation; 2016. Available from: https://responsiblegambling.vic.gov.au/documents/139/Victorian_gambling_study_technical_report_four_Jan_2016.pdf.

19. Abbott M, Bellringer M, Garrett N, Mundy-McPherson S. *New Zealand 2012 National Gambling Study: Overview and gambling participation (Report number 1)*. Auckland, New Zealand: Auckland University of Technology, Gambling and Addictions Research Centre; 2014.

20. Abbott M, Bellringer M, Garrett N, Mundy-McPherson S. *New Zealand 2012 National Gambling Study: Gambling harm and problem gambling (Report number 2).* Auckland, New Zealand: Auckland University of Technology, Gambling and Addictions Research Centre 2014.

21. Abbott M, Bellringer M, Garrett N, Mundy-McPherson S. *New Zealand 2012 National Gambling Study: Attitudes towards gambling. (Report number 3).* Auckland, New Zealand: Auckland University of Technology, Gambling and Addictions Research Centre; 2015.

22. Abbott M, Bellringer M, Garrett N, Mundy-McPherson S. *New Zealand National Gambling Study: Wave 2 (2013) (Report number 4).* Auckland, New Zealand: Auckland University of Technology, Gambling and Addictions Research Centre; 2015.

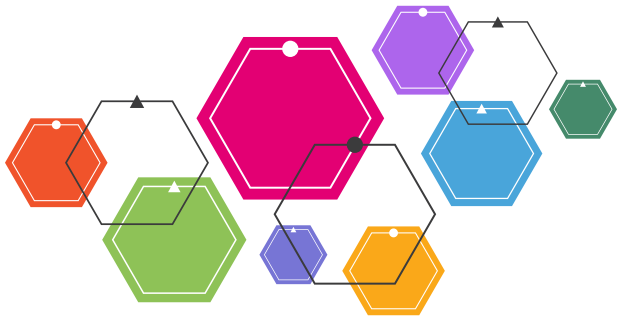
23. Abbott M, Bellringer M, Garrett N, Mundy-McPherson S. *New Zealand Gambling Study: Wave 3 (2014) (Report number 5).* Auckland, New Zealand: Auckland University of Technology, Gambling and Addictions Research Centre; 2016.

24. Abbott M, Bellringer M, Garrett N. *New Zealand National Gambling Study: Wave 4 (2015) (Report number 6).* Auckland, New Zealand: Auckland University of Technology, Gambling and Addictions Research Centre; 2018.

25. Abbott M, Bellringer M, Garrett N, Kolandai-Matchett K. Design and methods of the New Zealand National Gambling Study, a prospective cohort study of gambling and health: 2012-2019. *International Journal of Mental Health and Addiction*. 2017;15(6):1242-69.

26. Volberg R, Williams R, Stanek E, Houpt K, Zorn M, Rodriguez-Monguio R. Gambling and problem gambling in Massachusetts: Results of a baseline population survey. Amherst, MA: School of Public Health and Health Sciences, University of Massachusetts, Amherst; 2017, September 15.

27. Volberg R, Williams R, Stanek E, Zorn M, Mazar A. Analysis across three waves of MAGIC. Amherst, MA: School of Public Health and Health Sciences, University of Massachusetts, Amherst; 2018.



6. Topics for Future Investigation

Although many of the factors related to harmful gambling are well known, there is still much to be discovered. New developments in gambling technologies and treatment interventions, and changes in areas such as the policy environment, social attitudes, and access to gambling raise new questions about how we can prevent harm from occurring. In this section, we outline areas related to harmful gambling that require more research attention. Many topics were identified through an earlier consultation process undertaken by GREO as part of the first revision of the *Conceptual Framework of Harmful Gambling* (2015). Others have been added to this edition in response to issues and concerns that have become more pressing, as well as new learning and developments that have taken place.

The future research topics and approaches outlined below are not exhaustive, but will perhaps offer some direction to people who hope to contribute to the current knowledge base. The topics are grouped by overall factor theme, in no priority order, with the understanding that they are inter-connected and there may be some overlap. There is another section for other research areas that are not easily categorized, along with a section specific to research design.

6.1 TOPICS ALIGNED WITH GAMBLING SPECIFIC FACTORS

GAMBLING ENVIRONMENT

Evidence-based policy making: There is a need to integrate harmful gambling research into the development of public policies related to gambling. This would allow for the development of evidence-based policies that can have an impact on both gambling establishments and individual gamblers. Research on what particular changes in public policy would reduce the harmful effects of gambling would also be informative.

New forms of gambling: The history of states/provinces, governments, and lawmakers acting in an informed and reasonable way around video games is far from promising. It will be useful in the coming years to analyze governmental responses to the loot box phenomenon in order to understand the agendas of lawmakers and, in turn, help to inform them on best practice in response to perceived or real potential for harms.

Research on the impacts of gambling: Williams, Rehm, and Stevens[1] identified areas of future research in this area, including: (1) the impacts of some forms of gambling that have been introduced recently (e.g., Internet gambling, social gambling) or have not been thoroughly investigated in the past (e.g., lotteries, horse racing, bingo); (2) certain types of impacts have not been studied, such as the impacts of gambling on property values, regulatory costs, and social capital; (3) more research is required on the impacts of gambling in European countries and non-Western jurisdictions; and, (4) more research is needed on the impacts of gambling on indigenous peoples outside the United States.

Research on the impact of advocacy efforts: Grassroots advocacy groups related to other addictions (such as Mothers Against Drunk Driving – MADD) have had a considerable impact on harm reduction. New research could explore the extent to which similar advocacy groups focused on harmful gambling and its associated effects have affected, or have potential to affect, policy change.

GAMBLING EXPOSURE

Normalization of gambling: We need more research that examines the impact of gambling operators' media portrayal of and communication of gambling to the public. The depiction of gambling as a routine activity may serve to normalize gambling in the eyes of the public. The extent of this normalization and its effect on harmful gambling behaviour needs to be better understood.

Venue location and design: More research could be conducted on the location of gambling facilities, and the impact of these facilities on the local economy, property values, harmful gambling, crime, and other factors. Studies are also needed on cultural differences in venue design, and how elements of venue design induce specific behaviours in individual gamblers.

Gambling expansion: The impact of the expansion of opportunities and increased privatization of gambling, and the role of new technologies in exacerbating or mitigating harmful gambling issues need to be better understood. The impact of the Internet and social media on gambling also needs greater attention.

Impact of incentives/disincentives of harmful gambling: There is limited research on the financial cost of gambling (i.e., the consumer price) and how it is related to promoting and/or reducing gambling and harmful gambling. For example, the availability of free or inexpensive bus transportation to casinos for senior citizens is likely to make gambling more accessible to this demographic group. Additionally, there is currently no admission cost at most gambling venues. Introducing entry costs could deter some gamblers. Loyalty programs and high-stakes rooms at casinos that might provide gamblers incentives for gambling–including friendly or lavish treatment, and complimentary dinners–need to be studied further to better understand whether they increase feelings of confidence and self-worth or prolong gamblers' stays.

GAMBLING TYPES

Gambling participation: It is often assumed that if more people gamble and/or the net turnover on the gambling market increases, harmful gambling will increase proportionally (also referred to as the "Total Consumption Model"). However, this assumption seldom acknowledges that some forms of gambling have a high potential to create harm (e.g., online slots), while others have a low potential (e.g., traditional lotteries). Therefore, if more people participate in harmful forms of gambling, harm is likely to increase, but not necessarily when more people participate in relatively harmless forms of gambling. If participation in less harmful forms substitutes for participation in more harmful forms, increased participation may, in theory, reduce rather than increase harm. It would be useful to know more about the extent to which the Total Consumption Model applies to gambling.

Incorporation of gambling elements within gaming: More research is required to understand what impacts gambling elements within gaming have on both gaming and gambling participation, as well as on harm associated with both types of activity. This includes consideration of the possibility that gambling-type games not for money may provide a substitute for at-risk and problem gamblers, and assist them to reduce or stop gambling.[2]

Youth and the overlap between gaming and gambling: There is significant public concern about young people paying to access loot boxes, but there is no data at present about what age demographics actually engage with loot boxes. Research is needed to understand this element of their play. We also need to understand how loot box use ties into other aspects of the life course, such as income, independence, leisure time, working hours, and the like, and the extent to which it might be linked to harm.

Research on "high rollers": There is an interest in understanding the prevalence and nature of problem gambling among people who place large value bets during gambling, including those who spend much of their time at casinos in "high-stakes" rooms.

GAMBLING RESOURCES

Treatment availability and hours: More research is needed on the impact of treatment availability for harmful gamblers, such as hours of operation and the location of treatment services. It is also important to examine the efficiency, and cost effectiveness, of Internet-based treatments.

Innovative and integrative gambling resources: There is an ongoing need for rigorous research regarding the therapeutic benefits of interventions for problem gambling, with standardized outcome measures, appropriate comparator conditions, and long-term follow-up periods. Moreover, there is little research for innovative biological and psychosocial interventions (e.g., neurostimulation, cognitive retraining, and remediation) and for integrative treatment approaches that consider comorbid mental illness and addiction. Other important topics include scalable treatments that are accessible to the full range of those experiencing gambling-related harms, and cultural adaptations or specific approaches that are attuned to the unique needs and values of vulnerable or marginalized groups.

Youth education and prevention strategies: Treatment providers often do not have a good understanding of which education and prevention strategies are most effective with teens and young adults. They have noted that the connection between harmful gambling and other addictions in youth is not clear either. Further research in this area could help them to develop strategies that resonate better with young people.

6.2 TOPICS ALIGNED WITH GENERAL FACTORS

CULTURAL

Indigenous Peoples: New directions and emerging areas of inquiry in Indigenous gambling studies require further research. Areas already identified include problematizing the role of culture in gambling harm or avoidance;[3, 4] Indigenous perspectives in gambling harm and intervention approaches;[5-7] and–collaborative research to accommodate the voices of Indigenous Peoples.[8, 9] Indigenous voices addressing gambling harm exist, but are not reflected in the literature (e.g., see Cook, Manitowabi, Voght, and Wahsquonaikezhik[10]). Additionally, there is a need to understand gambling harm in Indigenous Peoples outside of Australia, New Zealand, Canada, and the United States. This could facilitate capacity building in Indigenous-centred research, and expand approaches to understanding harm and Indigenous approaches to harm intervention and prevention. Lastly, there is a need for other global nations with Indigenous Peoples to recognize relationships with Indigenous Peoples and support research programs that allow for a more comparative understanding of gambling and Indigenous Peoples globally.

Intersectionality understanding: How are harmful gambling and different kinds of interventions affected by socioeconomic factors, such as gender, ethnicity, and other stratification systems? Intersectionality is a lens through which we can see where power comes from and collides, and where it intersects with different social conditions.

SOCIAL

Loss of opportunities: More research needs to be conducted on the impact of gambling problems on educational, vocational, financial, and relationship opportunities. Even when people can overcome gambling problems, they may not be able to recover from the loss of academic achievements and vocational opportunities. This can have a long-term impact on other areas of their lives. The damage caused to relationships, including severed ties with friends and family, can also have a life-long effect on mental health.

Research on older adults: The older adult population (55+ years of age) may be especially vulnerable to gambling harm. Some people experiencing major life transitions such as the death of a spouse, retirement, or the onset of chronic health conditions that limit activity participation may use gambling to cope with feelings of loss or as a substitute for other activities. Since many are no longer employed, it is more difficult to recover from financial loss. One treatment provider pointed out that the overwhelming majority of their hotline calls is from seniors. This is considerably higher than support lines for other addictions.

Financial instability and homelessness: There is a need for further research into financial instability and homelessness related to destructive gambling habits, and how such extreme situations can be prevented through early intervention and treatment. We also need more information about the nature of the relationship between homelessness and gambling. In other words, do people with gambling problems become homeless, or do homeless people turn to gambling as a form of coping?

Gambling among prison populations: More research is required to understand how harmful gambling behaviour changes upon incarceration, particularly with youth. This can involve an onset, increase, or decrease in gambling behaviours in prisons and similar settings.

PSYCHOLOGICAL

Harmful gambling in the context of other addictions: Additional research could further the understanding of the relationship between harmful gambling and other addictions, the shift that some individuals make from one addiction to another (e.g., when some people with gambling problems stop gambling they turn to another addiction), and the comorbidity of harmful gambling and other addictions.

Mental health: Research is needed to understand the extent to which mental health issues related to harmful gambling are a cause versus an effect.

Other conditions and syndromes: Some researchers have pointed out that Asperger's Syndrome and Attention Deficit Hyperactivity Disorder (ADHD) may be associated with an increased risk of developing gambling problems.

BIOLOGICAL

Physical health: Treatment providers have highlighted the lack of research into physical ailments that they see in the people they treat for harmful gambling issues. Ailments include hypertension, ulcers, migraines, irritable bowel syndrome, and poor quality of life. The physical effects from drinking or smoking while gambling are also a concern. Physical ailments may also lead to harmful gambling (e.g., being immersed in gambling can distract people from pain).

OTHER

Recreational gambling: Research in the gambling field is mostly focused on harmful gambling; however, the large majority of gamblers are not harmed by gambling. More research needs to be focused on establishing a better understanding of non-gamblers and recreational gamblers to learn about the associated resiliency factors.

Work schedules and leisure time: More research attention could be given to the impact of work schedules on harmful gambling behaviour. In the example of oil patch workers, the work cycle can be a full week of work followed by a full week of time off. This type of work schedule, and limited access to other leisure options in areas surrounding the oil patch, gives individuals ample time and opportunity to participate in gambling activities. Further, people with evening and night-time work shifts have less access to leisure activities that are scheduled to align with more traditional weekday work routines. Gambling, unlike many other leisure pursuits, is available in one format or another 24 hours a day.

Convergence of gaming and gambling: Video games are a form of leisure, and for the overwhelming majority of players, the evidence to date suggests that loot boxes form one part of that leisure activity. We need to understand more fully how loot boxes and other microtransactions tie into the leisure elements of video game play, and where precisely the elements of "fun" in loot boxes are found for those who choose to purchase them, as well as any potential connection to harmful gambling.

RESEARCH DESIGN

Longitudinal Research: Many researchers and treatment providers are interested in understanding more about causality between factors, but this requires funding of a larger number of prospective longitudinal studies. These studies could also shed more light on individual impacts and consequences associated with harmful gambling, as well as on individual predispositions to harmful gambling.

Disciplinary interconnections: Understanding the complexity of harmful gambling requires multi-disciplinary research efforts and very large sample sizes–something single research groups usually cannot manage because of financial and time constraints. Researchers advocate investment in research that analyzes complex interconnections (e.g., modelling large-scale U.S. addiction initiatives) and for GREO to continue to facilitate partnerships among Canadian researchers, policy makers, and citizens to support research that is informed by and relevant to a variety of perspectives.

Gender: Gambling seems to produce and reinforce gender structures. Separate analyses for men and women are required to identify important differences and gendered processes. However, it is also important to see the overall similarities between women and men to avoid reinforcing stereotypical images of gender, along with the contributions of other life circumstances.

REFERENCES

1. Williams RJ, Rehm J, Stevens RMG. The social and economic impacts of gambling. Calgary, AB: Canadian Consortium for Gambling Research; 2011. Available from: https://www.uleth.ca/dspace/bitstream/handle/10133/1286/SEIG_FINAL_REPORT_2011.pdf.

2. Gainsbury SM, King DL, Abarbanel B, Delfabbro P, Hing N. Convergence of gambling and gaming in digital media. Melbourne, Australia: Victorian Responsible Gambling Foundation; 2015. Available from: https://www.responsiblegambling.vic.gov.au/__data/assets/pdf_file/0003/25572/Gainsbury_convergence_of_gambling_and_gaming_2015.pdf.

3. Kolandai-Matchett K, Langham E, Bellringer M, Siitia PA-H. How gambling harms experienced by Pacific people in New Zealand amplify when they are culture-related. *Asian Journal of Gambling Issues and Public Health*. 2017;7(1):5.

4. W B Urale P, Bellringer M, Landon J, Abbott M. God, family and money: Pacific people and gambling in New Zealand. *International Gambling Studies*. 2015;15(1):72-87.

5. Dyall L, Hawke Z, Herd R, Nahi P. Housework metaphor for gambling public health action: An indigenous perspective. *International Journal of Mental Health and Addiction*. 2012;10(5):737–47.

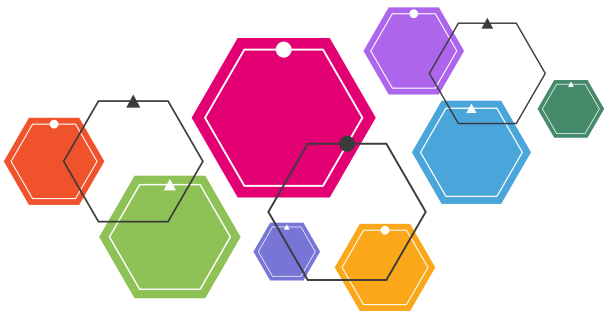
6. Morrison L, Boulton A. Reversing the harmful effects of gambling in indigenous families: The development of the Tu Toa Tu Maia Intervention. *Pimatisiwin: A Journal of Aboriginal and Indigenous Community Health*. 2013;11(2):255–68.

7. Morrison L, Wilson D. A family affair: Indigenous women's gambling journey. *International Journal of Mental Health and Addiction*. 2015;13(4):435–46.

8. Fogarty M, Coalter N, Gordon A, Breen H. Proposing a health promotion framework to address gambling problems in Australian Indigenous communities. *Health Promotion International*. 2018;33(1):115-22.

9. Hing N, Breen H, Gordon A, Russell A. The gambling behavior of Indigenous Australians. *Journal of Gambling Studies*. 2014;30(2):369-86.

10. Cook P, Manitowabi D, Voght A, Wahsquonaikezhik S. The Impact of Gambling on Indigenous Communities: Panel Discussion. Discovery 2018; 2018; Toronto, ON: Responsible Gambling Council.



Author Biographies

The contributors to this project included the international expert panel and a team of GREO staff and advisors. Each member of the expert panel played a role in the development of the Framework and its publication. Author responsibilities included:

- Actively participating in working sessions by contributing ideas, insights, and expertise during the development of the framework and publication content;
- Authoring different sections of the publication;
- Providing timely feedback on the Framework and publication drafts;
- Working with GREO to communicate the Framework to a broad set of stakeholders in order to solicit feedback.

Profiles of each expert panel member are provided below, in alphabetical order. This publication reflects the combined work of all the authors on the expert panel. Any conflicts of interest that may affect joint authorship of this publication are noted for each author.

Max Abbott, Ph.D.: Dr. Abbott is Pro Vice-Chancellor and Dean, Faculty of Health and Environmental Sciences, at Auckland University of Technology, New Zealand, where he is also Professor of Psychology and Public Health, Co-Director of the National Institute for Public Health and Mental Health Research, and Director of the Gambling and Addictions Research Centre. Previous positions include National Director of the Mental Health Foundation of New Zealand and President of the World Federation for Mental Health. He is currently Deputy Chair of Waitemata District Health Board and a Board member of Health Workforce New Zealand. He has over 250 publications in the fields of mental health and public health. He has researched gambling extensively, leading the first national problem gambling prevalence study worldwide. Recent major areas of research include gambling and problem gambling, migrant health, and Pacific Islander child and family health and development. He chairs the International Think Tank on Gambling Research, Policy and Practice, which provides a regular forum for researchers and other key stakeholders to discuss major and emergent issues. He is currently involved in large, ongoing gambling research programs in New Zealand, Sweden, and Australia. Dr. Abbott has no significant conflicts of interest. The large majority of funding that he and his Gambling and Addictions Research Centre colleagues receive comes from government departments and research funding agencies. The Centre occasionally receives industry funding for research with the proviso that the findings of such studies will undergo peer-review and be placed in the public domain.

Per Binde, Ph.D.: Dr. Binde is an Associate Professor of Social Anthropology at the University of Gothenburg, Sweden. Dr. Binde's interest in gambling is broad, but with a focus on the cultural dimension of gambling and its social contexts. He has conducted extensive field studies in Swedish gambling venues and using ethnographic and historical sources as a base, he has analyzed the distribution of gambling in the pre-colonial world, the relationships between gambling and socio-economic systems, and between gambling and religion. Several of Dr. Binde's empirical studies have concerned problem gambling, for example mutual support societies of problem gamblers and the impact of gambling advertising. He has also written about regulation issues, analyzed data from population studies, and reviewed various areas of gambling research. Dr. Binde is a member of the international advisory board of the Swedish Longitudinal Gambling Study (Swelogs). Dr. Binde has no conflicts of interest as he has no current or past affiliations with the industry; all his research funding has come from national research councils and from government funded agencies and authorities in Sweden, with the exception of a minor grant from the Responsible Gambling Trust in the UK, which is an independent charity receiving economic support from gambling companies.

Luke Clark, D.Phil.: Dr. Clark is an Associate Professor in the Department of Psychology at the University of British Columbia, where he is the Director of the Centre for Gambling Research at UBC. His research focuses on the psychological and neural mechanisms that underlie gambling behaviour, and the roles of these processes in problem gambling. His research utilizes a number of convergent approaches, including behavioural analysis, functional brain imaging, and psychophysiology. He has published over 150 papers in peer-reviewed journals including *Proceedings of the National Academy of Sciences*, *Brain*, *Journal of Neuroscience*, and *Biological Psychiatry*. He is an assistant editor for *Addiction* and *International Gambling Studies*, and he was awarded the Scientific Achievement Award by the National Center for Responsible Gaming in 2015. As relevant disclosures, the Centre for Gambling Research at UBC is supported by funding from the Province of British Columbia and the British Columbia Lottery Corporation (BCLC), a Crown Corporation that conducts and manages gambling provision across the province.

Mark R. Johnson, Ph.D.: Dr Johnson is a Killam Postdoctoral Fellow in the Department of Political Science at the University of Alberta. His research focuses on the intersections between money and play and their attendant ideological entanglements, such as professional video game play or "Esports", live streaming and Twitch.tv, daily fantasy sports betting, loot boxes and game microtransactions, gamification, gamblification, and the role of money in gaming culture more broadly. He has published in journals including *Information, Communication and Society*, *Social Studies of Science*, *The Sociological Review*, *Convergence*, and *Games and Culture*, and his first monograph, "The Unpredictability of Gameplay" is due out in late 2018 from Bloomsbury Academic. He is currently developing two monograph projects, one examining the labour and career dynamics of professional video game live streaming, and another analysing the ideological and design elements of daily fantasy sports betting platforms. The majority of his funding has come from

funding agencies and research bodies, but he has also received funding from Gambling Research Exchange Ontario (GREO) and Alberta Health Services (AHS) to study the growing phenomenon of loot boxes in video games. He is a regular commentator on games issues on television, radio, and in newspapers and magazines; and outside academia he is also an independent video game developer, and a former professional poker player.

David Hodgins, Ph.D.: Dr. Hodgins is a Professor of Psychology at the University of Calgary located in Calgary, Alberta. He is also a coordinator of the Alberta Gaming Research Institute. His research interests focus on relapse and recovery from substance abuse and gambling disorders. He has a particular interest in concurrent mental health disorders and brief motivational treatment. He has developed a brief treatment for gambling problems that uses a motivational enhancement model, which is recognized as an evidence-based treatment by the United States Substance Abuse and Mental Health Administration. In 2010, he received the Scientific Achievement Award from the US National Center for Responsible Gaming. Dr. Hodgins teaches in the clinical psychology program and has an active cadre of graduate students. He maintains a private practice in addition to providing consultation to a number of organizations internationally. He is senior editor of the journal *Addiction* and is on the editorial board of the *Journal of Gambling Studies*, *International Journal of Gambling Studies,* and the *Journal of Gambling Issues*. Dr. Hodgins has no conflicts of interest and no affiliation with the industry. All of his research funding has come from peer-reviewed submissions to government-funded research agencies.

Darrel Manitowabi, Ph.D.: Darrel Manitowabi is an Associate Professor in the School of Northern and Community Studies, Laurentian University, Sudbury, Ontario. He holds cross-appointments in the School of Indigenous Relations, Laurentian University and the Northern Ontario School of Medicine, Human Sciences Division. He is a citizen of the Wiikwemkoong Unceded Territory, and he currently resides in the Whitefish River First Nation. He has a PhD in sociocultural anthropology from the University of Toronto and has published articles on Indigenous tourism and gaming, Ojibwa/Anishinaabe ethnohistory, urban Indigenous issues, and Indigenous health. His interest in gambling is the intersection of the Indigenous cultural practice of gambling within the context of colonialism, determinants of health, and Indigenous self-determination. He has previously conducted in-depth ethnographic research in the Chippewas of Rama First Nation in south-central Ontario examining the holistic impact of Casino Rama within the context of a historical, social, cultural, and economic framework. This research has resulted in demonstrating how Indigenous gambling regulation is contiguous with historic colonial forms of Indigenous-state relations; and how an ethnographic analysis of Indigenous expressions of gambling reveals the invisibility of Indigenous agency in community development, decolonization, and the negotiation of the harmful effects of the casino complex, inclusive of addictive outcomes. More recently his interest lies in the ethical engagement with understanding contemporary Indigenous gambling policy development. He also continues to examine gambling as a restrictive expression of nationhood within the boundaries of neoliberal settler-states, thus reframing an understanding of colonialism of Indigenous peoples through the mechanism of gambling studies.

Lena C. Quilty, Ph.D.: Dr. Quilty is a Senior Scientist in the Campbell Family Mental Health Research Institute, Centre for Addiction and Mental Health (CAMH), and Assistant Professor in the Department of Psychiatry, University of Toronto. She is a registered clinical psychologist and certified cognitive behavioural therapist. Dr. Quilty has an applied program of clinical research, with a focus on personality and cognitive moderators and mediators of illness course and treatment response. She has a particular interest in the role of reward-related processes and executive function in depression and addiction. At CAMH, Dr. Quilty led the development of a multidisciplinary research team focused on key mechanisms underlying pathological gambling related to emotional dysregulation and impulsivity, and the translation of this research to prevention and treatment. She prioritizes knowledge translation and exchange in her work, and has disseminated the results of her research in over 100 scholarly publications, and numerous local, provincial, and national academic conference presentations and invited talks and workshops to diverse end-users (e.g., patients, clinicians, industry stakeholders). She is a Consulting Editor for *Psychological Assessment*. Dr. Quilty has received salary and operating funds from funding agencies including the Canadian Institutes of Health Research, National Institutes of Health, American Foundation for Suicide Prevention, Ontario Brain Institute, Ontario Mental Health Foundation, Gambling Research Exchange Ontario, and Canadian Consortium for Gambling Research.

Jessika Spångberg (formerly Svensson), Ph.D.: Dr. Spångberg is a public health scientist and gender researcher who works with problem gambling and other public health issues at Public Health Agency of Sweden. She is also a senior lecturer at the Department of Social Work at Mid Sweden University where she conducts research on youth and gambling within the research program REGAPS (Responding to and Reducing Gambling Problems) at Stockholm University. Her interest in gambling is on policy, prevention, social contexts, and gender. Dr. Spångberg has performed two systematic reviews on interventions to prevent problem gambling that are published by the Public Health Agency of Sweden. Her doctoral thesis, "Gambling and gender: A public health perspective," was published 2013. Further, she has worked closely with the mutual support societies of problem gamblers in Sweden and is involved in the Swedish Longitudinal Gambling Study (Swelogs).

Rachel A. Volberg, Ph.D.: Dr. Volberg is a Research Associate Professor in the School of Public Health and Health Sciences at the University of Massachusetts Amherst and President of Gemini Research, Northampton, MA, USA. Dr. Volberg is a sociologist who has been involved in epidemiological research on gambling and problem gambling since 1985. Dr. Volberg has directed or consulted on numerous gambling studies around the world, including national prevalence surveys in the United States, Australia, New Zealand, Great Britain, Norway, and Sweden and longitudinal cohort studies in Australia, New Zealand, and Sweden. She is currently the Principal Investigator on two major studies funded by the Massachusetts Gaming Commission, including the Social and Economic Impacts of Gambling in Massachusetts (SEIGMA) study and the Massachusetts Gambling Impact Cohort (MAGIC) study. Dr. Volberg has served as a consultant and advisor to governments and private sector organizations on issues relating to gambling legalization, the epidemiology of problem and pathological gambling,

and public policy approaches to developing and refining services for problem gamblers and their families. She has served on the Editorial Boards of the *Journal of Gambling Studies, International Gambling Studies,* and the *Journal of Gambling Issues* and she is a long-time member of the American Sociological Association and the U.S. National Council on Problem Gambling. Dr. Volberg has no current affiliations with industry although she has worked as a consultant to individual operators in the past. All sources of funding for Dr. Volberg's research are government agencies with responsibilities for regulating gambling or providing services to problem gamblers.

Doug Walker, Ph.D.: Dr. Walker is a professor in the Department of Economics at the College of Charleston. In the fall of 2014, he was a visiting professor at Harvard Medical School and the Cambridge Health Alliance, Division on Addiction. His primary research interest is on the economic and social impacts of gambling, particularly casino gambling, which he has been studying for about 20 years. Dr. Walker's most recent interest is in "responsible gambling." He has published two books and more than 50 articles and book chapters on the socioeconomic impacts of gambling, and has served as an advisor or consultant for industry groups, state governments, and consulting firms.

Robert Williams, Ph.D.: Dr. Williams is a Professor in the Faculty of Health Sciences and Coordinator of the Alberta Gambling Research Institute, University of Lethbridge, Lethbridge, Alberta. A clinical psychologist by training, Dr. Williams spent the first 15 years of his career as the regional psychologist for northern Manitoba and then as a clinician in the Addiction Centre in Calgary, Alberta. Since 2001 he has been an academic at the University of Lethbridge in Alberta, where he is currently a full professor in the Faculty of Health Sciences, as well as one of the coordinators and researchers with the Alberta Gambling Research Institute. Dr. Williams has published in the areas of addictive behaviour, psychophysiology, seasonal affective disorder, evolutionary theory, fetal alcohol syndrome, health care practice, public policy, and gambling. For the past 15 years most of his work has focused on gambling, where he is an internationally recognized expert. Dr. Williams teaches courses on gambling and provides frequent consultation to government, industry, the media, the courts, and public interest groups. Dr. Williams is one of the world's best funded gambling researchers and a leading authority in the areas of prevention of problem gambling, Internet gambling, the socioeconomic impacts of gambling, the proportion of gambling revenue derived from problem gamblers, the prevalence and nature of gambling in Aboriginal communities, the etiology of problem gambling, and best practices in the population assessment of problem gambling. Dr. Williams has no conflicts of interest. Virtually all of his research funding has either come from government-funded research agencies or directly from government contracts.

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Paul Delfabbro, Ph.D.: Dr. Delfabbro is an Associate Professor from the School of Psychology at the University of Adelaide, Australia. He has over 190 publications in various areas of social policy, including gambling and child protection, and is a frequent advisor to State and Federal Government Departments. His current research areas relate to the relationship between comorbidity and decision making, behavioural profiling of problem gamblers in venues, and the effects of variations in EGM parameters on gambling behaviour.

Jim Orford, Ph.D.: Dr. Orford is an Emeritus Professor of Clinical and Community Psychology at the University of Birmingham, U.K. Jim has achieved a national and international reputation in the fields of addiction and community psychology. He has published many articles and 13 books, the latest of which are "An Unsafe Bet? The Dangerous Rise of Gambling and the Debate We Should Be Having" (Wiley-Blackwell, 2011) and "Addiction Dilemmas: Family Experiences in Literature and Research and their Lessons for Practice" (Wiley-Blackwell, 2012).

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GREO Team

Gambling Research Exchange Ontario's purpose is to use credible, research-based evidence to reduce harm from gambling. The primary beneficiaries of our work include the citizens of Ontario, the government, service providers, educators, policy makers, researchers, regulators, and operators. GREO is a critical research resource for the province of Ontario. It is also a national and international leader and collaborator in gambling and problem gambling research, knowledge translation, and research capacity building. GREO is valued for its integrity, independence, expertise, and productivity.

The Conceptual Framework of Harmful Gambling project is a key component of GREO's strategic plan and supports an important outcome: the consolidation of theoretical understanding to further develop testable theories on the causes and factors influencing harmful gambling, and resilience to gambling.

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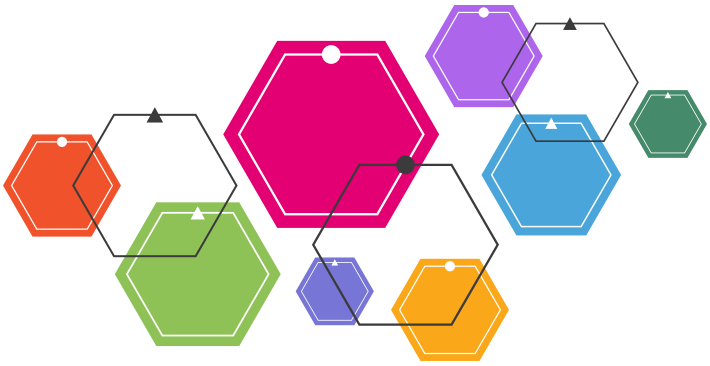

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