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Article in *Public Health* · April 2020

DOI: 10.1016/j.puhe.2020.04.003

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Themed Paper – Review

## The changing epidemiology of gambling disorder and gambling-related harm: public health implications

M.W. Abbott

Auckland University of Technology, Faculty of Health and Environmental Sciences, North Campus, AG Building, 90 Akoranga Drive, Northcote, Auckland, 0627, New Zealand

### ARTICLE INFO

#### Article history:

Received 24 September 2019  
 Received in revised form  
 13 March 2020  
 Accepted 2 April 2020  
 Available online xxx

#### Keywords:

Gambling  
 Epidemiology  
 Prevalence  
 Harm  
 Public Health

### ABSTRACT

**Objectives:** Gambling availability, participation and expenditure have increased markedly in many parts of the world. This is expected to continue and have significant public health impacts. The purpose of this study is to examine the changing epidemiology of gambling and gambling-related harm and its implications for public health policy and practice.

**Study design:** This is a narrative review.

**Methods:** Relevant literature, with an emphasis on recent studies and reviews, was examined to identify major epidemiological findings and trends.

**Results:** Greater gambling availability was associated with an increase in participation and expenditure and a rise in at-risk and problem gambling prevalence rates. While problem gamblers experience considerable harm, most harm arises from non-problem gamblers. These harms are substantial and impact disproportionately marginalised populations. The burden of harm is mainly due to financial problems, damage to relationships and health, psychological distress and adverse effects on work and education. Although at-risk and problem gambling rates initially increased in many jurisdictions, they subsequently declined. More recently, in some jurisdictions, while gambling participation has declined, at-risk and problem gambling rates have plateaued. This at least partly is due to an accumulating 'pool' of past problem gamblers who are highly prone to relapse and other vulnerable groups continuing to experience heavy gambling exposure.

**Conclusion:** Public health policies need to focus strongly on reducing exposure to more 'toxic' gambling forms as well as increasing the availability of interventions to assist at-risk and problem gamblers and prevent relapse. Policies and programmes are likely to be more effective if population heterogeneity is considered, and they also address the wide range of modifiable risk and protective factors at individual, community and societal levels. Many of these are shared with other health and social morbidities.

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During the past three decades, gambling availability, participation and expenditure have increased markedly. These increases are historically unprecedented. Although some markets are maturing, others are rapidly expanding, in part facilitated by growth in Internet sites that enable ready access from home, work and portable devices.<sup>1</sup> While the majority of expenditure is on terrestrial gambling, the online share is increasing. In some jurisdictions, more than half of gambling expenditure is now online.<sup>2</sup> In most countries, a significant majority of adults have participated in gambling activities at some time and a smaller majority of adults have done so during the past 12 months.<sup>3</sup>

Hundreds of prevalence studies have been conducted, providing general population estimates of participation in various forms of gambling and gambling-related problems. These studies have also provided information on the strength of relationships between participation in different gambling activities and problem gambling, as well as indicating which demographic and social groups are at higher risk. Adult problem gambling prevalence rates in the past 12 months are mostly within a range of 0.5–3.0%, with three to four times as many people reporting subclinical problems and harm.<sup>4,5</sup> Participation in some gambling forms, e.g., electronic gaming machines, horse race and sports betting and casino table games, is much more strongly linked to problem gambling than participation in most types of lottery. These 'toxic' forms of gambling are continuous in nature and have an element of skill or

E-mail address: [Max.abbott@aut.ac.nz](mailto:Max.abbott@aut.ac.nz).

<https://doi.org/10.1016/j.puhe.2020.04.003>

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perceived skill.<sup>6,7</sup> In most studies, youth, males and groups that are socially and economically disadvantaged have high prevalence rates.<sup>5</sup> However, in some jurisdictions, sociodemographic risk profiles have changed over time. For example, age and gender differences have diminished.<sup>2,8–10</sup>

Although there is a large literature on problem gambling prevalence, it is only relatively recently that high-quality general population prospective studies have been conducted, enabling incidence rates to be estimated and other transitions, including relapse, to be examined.<sup>11–18</sup> In addition, although long recognised that gambling is associated with a variety of health and social harms and costs, it is only in the last few years that frameworks and measures have been developed to assess wider gambling-related harms.<sup>2,19–23</sup> During this period, the first studies on gambling-related burden of harm were conducted.<sup>24,25</sup> Gambling-related burden of harm has been shown in two studies to be approximately two-thirds to three-quarters that of major depressive disorder and alcohol misuse and dependence and three times that of drug dependence. Harm is predominantly due to financial impacts, damage to health and relationships, psychological distress and adverse impacts on education and work.<sup>2,19,20</sup> The burden of harm is disproportionately borne by marginalised and disadvantaged population sectors and magnifies social and health disparities.<sup>9,11</sup> These studies focus on harm experienced as a consequence of peoples' own gambling. The extent of gambling-related harm is much greater when effects on family members, local communities and wider society are taken into account. Harm is also transmitted across generations.<sup>2</sup>

The studies on burden of harm also indicate that while problem gamblers experience the most harm, the majority of harm is attributable to at-risk and non-problem gamblers.<sup>22,24,25</sup> This is because while at-risk and problem gamblers experience lower levels of harm than problem gamblers, they are far more numerous in the population. This has been referred to as the prevention paradox or Rose hypothesis.<sup>26</sup> The reason for this term is that an implication of the findings is that harm reduction will only be partially achieved by focussing on high-risk and problem gamblers. To be effective, focussed measures will need to be augmented by universal interventions, addressed to the population as a whole.

Many factors influence patterns of gambling participation, problem gambling and wider gambling-related harm. Gambling accessibility, however, is a necessary condition for participation, and participation is a necessary condition for harm. It is widely believed that during the past three decades, increased availability has led to increased participation and harm. Orford expressed it thus, "Complex and multifactorial though causation is, the more the product is supplied in an accessible form, the greater the volume of consumption and the greater the incidence and prevalence of harm." He went on to say "I doubt there would be many who would argue with that basic public health law .... and I would be very surprised if that rule was not also true for gambling..." (p. 1236).<sup>27</sup>

Problem gambling, referred to as pathological gambling, was included in the International Statistical Classification of Diseases and Related Health Problems (ICD) in 1975 and the American Psychiatric Association Diagnostic and Statistical Manual of Mental Disorders (DSM) in 1980.<sup>28,29</sup> At that time, pathological gambling was considered to be chronic or chronically relapsing in nature. This conceptualisation was reflected in early measures of problem gambling including the widely used South Oakes Gambling Screen.<sup>30</sup> Only a lifetime assessment frame was used. Later, current, predominantly past 12 months, measures were developed. Prospective and clinical studies on subsequent prevalence found that problem gambling was typically transient and episodic. These findings influenced the reconceptualisation of problem gambling in the DSM-5 and ICD-11 where problem gambling is referred to as

gambling disorder.<sup>31,32</sup> In the DSM-5, there is provision for a distinction to be made between continuous and episodic forms, as well for specification of it being in early or sustained remission. The disorder can also be assessed as severe, moderate or mild.

Prevalence studies commenced during the early years of the expansion of commercial gambling. The early studies, in addition to advancing understanding of problem gambling, helped increase public awareness, informed public and political debate and led to measures being introduced to provide support for problem gamblers and their family members.<sup>33,34</sup> Gambling helplines and treatment services were established in a number of jurisdictions. Regulator- and industry-initiated responsible gambling measures such as venue exclusion were also introduced.

In a number of jurisdictions, there have been repeat prevalence studies, over years or decades. While often compromised by methodological deficiencies, these studies provide information on changes in gambling participation and problems. Early reviews generally concluded that during the 1980s and 1990s, there was an increase in gambling participation and problem gambling.<sup>35–38</sup> These increases were consistent with the availability or exposure hypothesis. This is similar to the total consumption or single distribution model that has been widely applied to alcohol and some other dangerous consumption. The model places emphasis on policies and interventions that reduce availability as a means to reduce consumption and harm.

Although the early reviews were generally supportive of the availability hypothesis, there were exceptions. Two research groups, while acknowledging findings consistent with availability, proposed that populations adapt over time, participate less and experience less harm. Proponents of adaptation do not reject availability.<sup>36,39</sup> They expect it to apply in some situations. For example, Abbott<sup>40</sup> proposed:

1. During exposure to new forms of gambling, particularly electronic gaming machines (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. (p. 11)

More recent reviews found support for both availability and adaptation. In addition, the results of some recent studies appear to be at variance with both hypotheses. Methodological variation and deficiencies compromise comparison of study findings over time. Two reviews made adjustments to help correct for methodological differences. Storer et al.<sup>41</sup> conducted a systematic review and meta-analysis of Australian and New Zealand prevalence studies conducted since 1990. The analyses adjusted for the different problem gambling measures used. Problem gambling prevalence was found to increase with higher EGM density and decrease over time when density was held constant. These relationships were very strong. The two measures, density and time, explained almost three-quarters of the variance in problem gambling prevalence. This means that over the two decades considered, the findings were in keeping with both the availability and adaptation hypotheses.

Williams et al.<sup>4</sup> examined all prevalence studies published since the late 1980s. Weightings were used to adjust for common methodological variations. In the three regions where there were sufficient data (Australia, Canada and the USA), prevalence rates

initially increased. Subsequently, they decreased: from the late 1990s in Canada and early 2000s in Australia and the USA. In contrast to the Australasian meta-analysis, this review did not assess gambling availability in relation to problem gambling prevalence. However, in all jurisdictions, the availability of gambling increased during the period considered. These results are also consistent with both the availability and adaptation hypotheses.

The most recent worldwide prevalence review, covering the period from 2000 to 2015, found estimates of the past year ranged from 0.1% to 5.8%, very similar to the range from an earlier review by Williams et al.<sup>4</sup> In jurisdictions where more than one study had been conducted, prevalence rates almost always remained stable. Because no adjustments were made for methodological variation, the findings need to be treated with caution. However, they appear to be consistent with the adaptation rather than the availability hypothesis.

As mentioned, the availability hypothesis purports that increased availability leads to greater participation and more harm. The adaptation hypothesis proposes plateauing and a reduction in harm in populations and population sectors exposed to gambling for moderate to long periods of time. The adaptation hypothesis does not explicitly consider the part that gambling participation plays in this. However, it has been suggested that increased public awareness of harm associated with various types of gambling and other factors may contribute to reduced gambling participation and that this would, in turn, play a role in harm reduction.<sup>40</sup> In this respect, the availability and adaptation hypotheses are the same; both predict harm reduction when participation declines. None of the foregoing reviews examined problem gambling prevalence in relation to gambling participation over time. There are, however, a growing number of jurisdictions where there have been repeat studies that have included the same or similar measures of gambling participation and problem gambling.<sup>42–47</sup>

From these studies, it is evident that during the past decade, gambling participation has fallen significantly in a number of jurisdictions, despite continued increases in gambling availability.<sup>42–47</sup> These reductions are typically apparent for most types of gambling and across all or most sociodemographic groups. These reductions have not, however, been accompanied by falls in the prevalence of problem and at-risk gambling. In two studies, although reduced participation was much greater for young adults, problem and at-risk gambling increased in this population sector.<sup>43,44</sup> These findings are counter to both the availability and adaptation hypotheses. For scientific and policy reasons, it is important to understand why problem and at-risk prevalence rates (and presumably wider gambling-related harms) can remain unchanged, or even increase, in the face of decreased gambling participation. The findings of recent prospective studies are instructive here.

Prospective studies indicate that frequent engagement with continuous and partially skill-based gambling activities strongly predicts future at-risk and problem gambling onset.<sup>12–18</sup> Participation in multiple gambling activities, high expenditure, starting gambling at a young age and experiencing early big wins are also implicated. While gambling availability and participation are major and necessary causes of gambling and gambling-related harm, other risk factors play a substantial part in problem gambling onset (incidence), remission and relapse. Consistent with other research, prospective studies confirm the male gender, youth and low-income people are typically at elevated risk for problem gambling development. In some studies, a variety of ethnic, indigenous, migrant and religious groups have also been shown to be at high risk. Other risk factors identified include low education and unemployment.<sup>11–18</sup>

Gambling disorder and a number of mental health and addictive disorders are highly comorbid.<sup>48</sup> Recent prospective studies have found that people with behavioural addictions and alcohol and other substance dependence are at elevated risk for problem gambling development.<sup>11–18</sup> Childhood trauma and abuse, experience of major life events, feelings of marginalisation and high psychological distress have also been shown to predict problem gambling development.<sup>49</sup> A range of cognitive, neurocognitive and neurobiological factors are also involved.<sup>50</sup> Many of the risk factors for problem development also contribute to relapse. The persistence or increased prevalence of many of these risk factors could contribute to problem gambling plateauing.

The prevalence of problem and at-risk gambling is driven by the inflow of new and relapsed cases (incidence) and outflow (remission, recovery, migration and death). Prevalence reduction requires policies and interventions that reduce first-time incidence (primary prevention), enhance recovery, prolong remission and prevent relapse. In populations and population sectors with moderate- to long-term exposure, it appears that over a one to three period, at least a half of 'new' problem gamblers are past cases that are relapsing.<sup>13–17</sup> In these situations, there are large pools of past problem gamblers who remain highly prone to relapse. This may be the major reason why problem gambling prevalence rates have plateaued despite decreased participation.

Plateauing may also, in part, be a consequence of vulnerable groups that had continued exposure to more 'toxic' gambling activities. These groups include youth, some recent migrants and others who have had little prior gambling exposure. Typically, while their gambling participation rates are low, individuals in these groups who do gamble are at very high risk for problem development and harm.<sup>2,3</sup> Many of these groups, as well as past problem gamblers, are over-represented in high deprivation communities that may, additionally, have high concentrations of gambling venues and outlets.<sup>2</sup> In this situation, it is likely that increased vulnerability, social and economic deprivation and high gambling exposure come together to increase the likelihood of problem development and relapse. Sociodemographic changes and increased marginalisation and deprivation could also contribute to plateauing in some jurisdictions. To date, standardisation to adjust for sociodemographic changes when considering prevalence changes over time have not been used in gambling epidemiological research.

While rarely addressed by inclusion in a comprehensive public health strategy, gambling is regulated in most countries and governments, industry and other organisations have introduced measures intended to assist problem gamblers, moderate gambling participation and reduce the prevalence of problem gambling.<sup>51,52</sup> Increasingly these and other measures are being framed in relation to a wider spectrum of gambling-related harm. A range of policy and prevention measures have been developed and applied. Many focus on the agent, gambling, and cover measures intended to reduce (1) gambling supply, (2) the potency of gambling activities and participation and (3) demand. The effectiveness of most measures is unknown or weak, and reviewers conclude that the least effective appear to have been the ones most often implemented.<sup>53</sup> The evidence base is more substantial for professionally delivered and self-directed interventions for gambling disorder.

In a number of jurisdictions, it appears that there have been three phases in the relationships between gambling availability, participation and harm.<sup>4,5,8,11</sup> Initially availability expanded rapidly and was accompanied by increased gambling participation and problem gambling. There is a strong relationship between problem gambling scores and scores on more comprehensive measures of gambling-related harm. Consequently, problem gambling prevalence can, to a degree, serve as a proxy for gambling harm. During

the next phase, availability continued to increase and participation and harm declined. In the third phase, availability increased, participation declined further and prevalence plateaued. The first two phases occurred in multiple jurisdictions.<sup>4</sup> The extent of the third is uncertain. Although little investigated, it seems likely that in complex societies, these phases occur simultaneously within different sociodemographic groups and communities.

While conventional epidemiological studies have demonstrated problem gambling and other harms associated with gambling, their findings require consideration in relation to a stage of gambling epidemic model (SGEM). Conventional epidemiology studies have been found to be out of step with the progression of epidemics of harmful exposure, e.g., to tobacco and alcohol.<sup>54</sup> The relative and absolute estimates of associated harms are invariably underestimated, and new harms are identified over time. It is expected that this will also apply to gambling. Indeed, this is becoming apparent in the recent harm and burden of disease studies.

Currently, alcohol consumption is increasing in most countries. Based on the stage of epidemic model, drawing from experience with tobacco, it is predicted that alcohol-attributable diseases and wider harms will continue to increase.<sup>55</sup> Significantly, in the present context, increases are expected to continue, even after consumption has peaked and starts to decrease. In the case of gambling, while problem gambling prevalence rates have generally not increased with declining participation, rates have not declined after a decade or more of falling participation in a number of jurisdictions.<sup>42–47</sup> Changes in other harms are not known because of the lack of earlier research. Adaptation and the lag between falling participation and reductions in gambling-related harm could be used by gambling industry groups and governments to argue against stronger regulatory and control measures.

## Conclusion and limitations

Reducing gambling exposure and participation are critical components of effective prevention and harm reduction policies. This is perhaps especially so for more at-risk and vulnerable groups including past problem gamblers. It is, however, also critical in reducing overall gambling-related harm, most of which is attributable to gamblers who do not meet diagnostic criteria for gambling disorder. While of major importance, reducing exposure and participation via supply reduction is unlikely on its own to reduce gambling-related harm in the short to medium term. In jurisdictions where most incident cases are now relapsing problem gamblers, it is important that effective early intervention and problem gambling treatments are made more widely available and that increased attention is given to relapse prevention. Universal and targeted policies and programmes that address major modifiable protective and risk factors (e.g., social, educational and economic disparities, unemployment, ethnic discrimination) could significantly augment gambling-focused interventions. A number of the non-gambling risk and protective factors also underlie other mental health disorders, morbidities and harms. Addressing these shared protective and risk factors can be expected to have widespread benefits. Likely benefits include reduced prevalence of these disorders as well as gambling-related harm and a reduction in health and social inequities.

This article draws on a wide-ranging search of literature including review articles and reports. However, there has been no systematic review of gambling participation and problem gambling research conducted after 2015. It would be timely to undertake a rigorous review of this type and augment it with systematic or scoping reviews of other areas of gambling research, including general population prospective studies and research on wider gambling-related harm.

## Author statements

### Acknowledgements

Giulia Lowe assisted with article formatting, referencing and submission.

### Ethical approval

Not required (does not include human subjects).

### Funding

None.

### Competing interests

None declared.

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