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ORIGINAL ARTICLE

Gambling and Gambling Harm in New Zealand: a 28-Year Case Study

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Abstract It has long been asserted that increased gambling availability leads to increased participation and harm (availability hypothesis). It has also been proposed that over time participation and harm decrease even when availability continues to rise (adaptation hypothesis). New Zealand has national gambling and problem gambling surveys dating from the mid-1980s. They include five-yearly surveys of gambling behaviour and attitudes from 1985 to 2005 and surveys of gambling and problem gambling in 1990 and 1999. The National Gambling Study (NGS) (2012–2015) was in part designed to assess changes in behaviour, attitudes and gambling-related harm since the 1999 and 2005 surveys. Selected NGS data are examined in relation to data from earlier surveys. A national lottery, instant lotteries and electronic gaming machines were introduced during the late 1980s. Since then, gambling availability continued to increase. Participation in most newly introduced gambling forms increased markedly, usually within the first year or two, and then decreased, often substantially. Following an initial rise, contrary to the availability hypothesis, overall participation declined. This was accompanied by a decline in problem gambling prevalence. These findings are consistent with adaptation. Since 2000, while participation continued to fall, problem gambling prevalence plateaued. This finding appears to be at variance with both the availability and adaptation hypotheses. It points to the importance of factors other than gambling availability in determining problem gambling and related harm. Possible reasons for the plateauing of problem gambling in the face of substantial reductions in participation are considered. They have implications for future research and policy.

Keywords Gambling · Problem gambling · Changes · Availability · Adaptation

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Worldwide, there has been substantial growth in gambling availability. This growth, which commenced in the mid to late 1980s, has been accompanied by increases in gambling participation and expenditure (Abbott et al. 2014b; Bogart 2011). The recent gambling boom has been accompanied by concern about gambling-related harm (Abbott et al. 2015a). In many jurisdictions, governments and other organisations commissioned general population surveys to assess gambling participation, attitudes and harm including problem gambling and related personal, family and social costs. These studies contributed to awareness and understanding of gambling and gambling-related harm, informed public and political debate and played a role in the initiation of legislative and other measures intended to reduce harm and assist problem gamblers and others affected by their behaviour (Volberg et al. 1996).

Throughout the 1970s and most of the 1980s, legal gambling in New Zealand was largely confined to Golden Kiwi (a state lottery) and on- and off-course betting on horse and dog racing (Grant 1994). In 1984, 80% of total official gambling expenditure was on track (horse and dog race) betting and 20% on lotteries. Throughout the 1970s to late 1980s, official gambling expenditure remained fairly constant (Abbott and Volberg 2000). New forms of gambling were introduced during the late 1980s, commencing with Lotto in 1987, electronic gaming machines (EGMs) in pubs and clubs in 1988 and Instant Kiwi (a scratch lottery) in 1989. From 1987 to 1990, official gambling expenditure more than doubled. In 1991, EGMs accounted for 19% of expenditure, track betting 39% and lotteries 42% (Abbott and Volberg 2001).

During the 1990s, casinos were established in major metropolitan areas and in a resort town. Free to air national television coverage of track betting was introduced with facilities for telephone betting, sports betting was legalised and additional lottery products were introduced (Daily Keno and TeleBingo). EGM venues and numbers continued to increase. By the end of the decade, total gambling expenditure again more than doubled, albeit that annual increases were at a lower rate than during 1987–1990 (Abbott and Volberg 2000). Post 2000, a further casino was established in another metropolitan area. New lottery products were introduced, e.g. Bullseye, and internet access was provided to betting on track and sports events and lottery products. EGM venues and numbers continued to increase until 2004. In 2004, there were 25,221 EGMs. At that time, gambling expenditure totalled $2.04 billion and non-casino EGMs accounted for a half of total expenditure.

The Gambling Act 2003 came into effect in 2004 (New Zealand Government 2013). The Act imposed limits on the number of non-casino EGMs in venues and gave territorial authorities more control over the number and location of venues. The Act prohibited the issuing of further casino licences and precluded existing venues from increasing their gambling provision. It also prohibited bookmaking and remote interactive gambling (gambling via the internet, telephone and text messaging). However, the purchase of lottery products and betting on track and sports events was still permitted online from approved New Zealand organisations and gambling on internet sites outside New Zealand remained legal.

The 2003 legislation mandates a comprehensive strategy informed by independent research. The strategy is required to prevent gambling-related problems, "promote informed and balanced attitudes, behaviours and policies towards gambling and gamblers" and protect vulnerable groups from gambling-related harms. Strategy objectives, plans and funding allocations are specified in the Ministry of Health 6-year strategic plans (Ministry of Health 2005, 2010a) and associated 3-year service plans (Ministry of Health 2007, 2010b, 2013). From the outset, these plans have included nationwide mass media campaigns intended to

increase public awareness and understanding of gambling, gambling harm and measures that can be taken to counter them (Walker et al. 2012).

Following the passage of the Act, non-casino EGM venues and numbers reduced steadily, and by 2012, the number of machines was 17,534, similar to the 2000 total and substantially less than the 2004 high point of 25,221. Non-casino EGM expenditure also reduced, from $1.04 billion in 2004 to $0.85 billion in 2012. Since 2004, total gambling expenditure has remained around $2 billion per annum. The non-casino EGM percentage has fallen from 50 to around 40%. Although overall gambling expenditure has remained fairly constant since 2004, it has dropped by a fifth in inflation-adjusted terms (Abbott et al. 2014a). The population has also increased considerably which means that falls in per capita expenditure have been greater. While inflation-adjusted expenditure has reduced, New Zealand remains among the top-ranked gambling countries, fourth behind Finland in terms of per capita expenditure (The Economist 2014).

New Zealand is unique in that it has a series of national gambling participation and attitudes surveys, dating from 1985 to 2005 (Department of Internal Affairs 2007). The first of these five-yearly surveys, undertaken by the Department of Internal Affairs (DIA), was conducted prior to the late 1980s gambling expansion. All surveys involved face-to-face household recruitment and interviews. While there were some changes in questions over the years, similarities in both the methodology and questionnaire content facilitates the examination of changes over time. A national survey of gambling and problem gambling was conducted in 1990, coinciding with the timing of the second DIA survey (Abbott and Volberg 1991, 1996; Volberg and Abbott 1994). This study was undertaken a few years before the development of problem gambling services in New Zealand. It was the first national study internationally to use a validated problem gambling measure (the South Oaks Gambling Screen—Revised: SOGS-R) (Abbott and Volberg 2006). A repeat of this study, using very similar methodology, was conducted in 1999, slightly before the fourth DIA survey (Abbott 2001; Abbott and Volberg 2000). In contrast to the DIA surveys, these studies used landline telephone recruitment and interviews. However, at that time, the great majority of residential dwellings had landline telephones and response rates were similar across the DIA and telephone surveys. Sample sizes were substantially larger in the two telephone surveys, among other things enabling potential differences between some smaller population sectors to be assessed.

Currently, a further national gambling and problem gambling study is underway in New Zealand (Abbott et al. 2014a, b, 2015a, b). The first phase, conducted during 2012, was a national prevalence survey designed, among other things, to facilitate comparison of findings with the DIA survey series and the 1990 and 1999 national gambling and problem gambling surveys. Participants were recruited from this phase for re-assessment at 12, 24 and 36 months. There will be a further assessment at 7 years. This survey, like the DIA surveys, involves face-to-face household recruitment and interviewing. In addition to assisting with comparison of the survey findings with those from the 20-year DIA series, this approach was taken as a consequence of the declining number of landline telephones, the complexity of using mixed mode recruitment (e.g. mobile and landline phones) and the importance of obtaining both a high response rate and maintaining high recruitment into subsequent phases of this prospective study.

Considering Availability and Adaptation Theories

It is widely believed that increased gambling availability in many parts of the world since the mid to late 1980s has led to increased gambling participation and that this in turn has resulted

in higher rates of problem gambling and other gambling-related harms. Some forms of gambling, particularly those that are continuous in nature and involve an element of skill or perceived skill, are often highlighted as being most strongly linked to gambling-related harm. EGMs have been referred to as the 'crack-cocaine of gambling' (Dowling et al. 2005). Early reviews (e.g. Abbott and Volberg 1999; Shaffer et al. 1997; Wildman 1998), as well as official review bodies (Productivity Commission 1999; National Research Council 1999; Gambling Review Body 2001), with varying degrees of qualification, all concluded that research findings are generally in keeping with the view that greater availability leads to increased participation and problems.

The availability or exposure hypothesis, as it has been referred to in the gambling literature, has parallels with what is known as the single distribution theory or total consumption model in the alcohol field. In essence, as initially proposed by Ledermann (1956), it maintains that there is a positive association between the average level of alcohol consumption and the proportion of heavy drinkers. There is support for this hypothesis in the alcohol literature. For example, reduced per capita alcohol consumption has been associated with reduced 'binge' drinking and alcohol-related harmful effects (Rose and Day 1990). In the alcohol field, it underpins prevention strategies that focus on reducing overall population consumption by restricting availability. The assumption is that this in turn will lead to reductions in consumption and harm across all drinking levels, including heavy and problematic drinkers. This approach places the emphasis for prevention on the agent, in this case alcohol, rather than on other factors that influence alcohol use and misuse including those pertaining to the host (the individual consumer) and wider economic, social and cultural environment.

In the gambling field, there is body of research with findings consistent with the availability and total consumption hypotheses. While acknowledging these findings, Shaffer et al. (1997) and Abbott et al. (1999) proposed that over time populations adapt to gambling exposure and that people gamble less and experience fewer problems, even when exposure increases. Shaffer et al. (1997, p. 57) believed that adaptation would probably be a slow process, "occurring perhaps only after decades and generations of social learning." The adaptation hypothesis was initially rejected by a number of gambling researchers, e.g. Orford (2005).

As indicated proponents of adaptation accept that the availability hypothesis applies in certain situations. However, they maintain that the model is over-simplistic and that in some circumstances other factors become more important and relationships between availability, participation and harm attenuate. More specifically, Abbott (2006) 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.

Although the identification of changes in gambling and problem gambling over time is compromised by methodological variability and deficiencies (Abbott et al. 2014a; Sassen et al.

2011), a number of reviews since the mid-2000s have found studies with findings that are not in keeping with the availability hypothesis (Abbott 2006, 2007; Abbott et al. 2004a, 2014a, b, c, 2015a; Vasiliadis et al. 2013). Two reviews have more directly examined the availability and adaptation hypotheses (Storer et al. 2009; Williams et al. 2012). Storer et al. (2009) examined 34 New Zealand and Australian gambling surveys that had been conducted since 1990. In their meta-analysis, adjustment was made for variations in the problem gambling measure that was used. The study found that problem gambling both increased with greater EGM density (EGMs per capita) and decreased over time when density was held constant. In other words, over a two-decade time span in Australasia, the findings were consistent with both the availability and adaptation hypotheses. The two independent variables, density of EGMs and passage of time, explained the majority of variance in problem gambling prevalence, suggesting that both are major factors in determining gambling-related harm.

Williams et al. (2012) reviewed jurisdiction-wide problem gambling prevalence studies that have been conducted throughout the world. Drawing on previous research by Williams and Volberg (2009), among others, they developed weightings to adjust for methodological differences between studies and produce prevalence estimates that could be more validly compared. They found that in all regions considered (Australia, USA and Canada), problem gambling prevalence initially increased then, over time, decreased. Although gambling availability or consumption was not formally examined in relation to prevalence, in all of these jurisdictions, availability increased throughout the period considered. At a general population level, the findings are consistent with availability followed by adaptation.

As mentioned, a second national gambling and problem gambling study was conducted in New Zealand in 1999 (Abbott 2001; Abbott and Volberg 2000), 9 years after the initial baseline survey (Abbott and Volberg 1991, 1992). Both were landline telephone surveys, had large samples and high response rates and were similar in design. It will be recalled that during the 1990s, the number of EGMs and EGM venues increased, casinos were established, sports betting was legalised and overall gambling expenditure doubled. While the study leaders expected that gambling participation and problems would increase from 1990 to 1999, it was found that past 6 months participation reduced in almost all gambling activities. Although there was no change in the proportion of adults that participated weekly or more in non-continuous forms such as Lotto, there was a substantial reduction in the proportion that participated this frequently in continuous forms. The subsequent 2000 DIA survey produced similar results. They will be presented and discussed later in this article. Also contrary to expectation at that time, but consistent with the reduction in regular participation in continuous forms of gambling, both lifetime and current probable pathological and problem gambling reduced significantly. Although these findings are in keeping with the adaptation hypothesis, Abbott and Volberg (2000) cautioned against inferring change from just two data points, even when study methodologies are similar or identical.

Recent Swedish (Abbott et al. 2014c) and Victorian (Abbott et al. 2015d; Hare 2015) studies have also examined changes in both gambling participation and problem gambling. In Sweden, from 1998 to 2009, and in Victoria, from 2003 to 2008, despite increased gambling availability, there were substantial reductions in participation across almost all demographic groups. These findings are not consistent with the availability hypothesis. Participation reductions included most forms of gambling including those most strongly associated with problem gambling in these societies. Despite these large reductions, unlike the situation in New Zealand a decade earlier, there were no changes in current problem or less serious problem gambling in either jurisdiction.

Some subpopulation findings in Sweden and Victoria are of interest. In both jurisdictions, reduced participation was particularly marked for youth. Rather than decreasing, or remaining unchanged, problem gambling prevalence increased among young people. Similar results applied to people with low levels of education in Sweden and metropolitan residents in Victoria. Participation decreased in these groups and problem gambling increased. These findings are the opposite to what would be expected from the availability and total consumption hypotheses.

The adaptation hypothesis predicts a levelling out or reduction in problem gambling in populations that have been exposed to gambling for moderately long periods of time. The adaptation hypothesis does not explicitly mention the part that gambling participation plays in this. However, it has been proposed that increased awareness of the risk and harm associated with some gambling forms and patterns of participation, among other factors, will lead to changes in attitudes and reduced gambling participation, including reduced participation in high-risk activities (Abbott and Volberg 2000). It was assumed that reduced consumption, particularly regular participation in continuous forms, would be a major factor in the reduction of problem gambling and other gambling-related harms. In this respect, the adaptation and availability models are the same. Both predict that a reduction in gambling participation, particularly in high-risk forms, will be associated with a reduction in hazardous consumption and harms. Both fail to predict or explain why reduced participation in some populations and population sectors has been associated with either no change or increased gambling problems.

There is little doubt that increased availability can lead to increased consumption and that increased consumption can lead to increased problems. However, this is far from inevitable. In both expanding and maturing gambling markets, it appears to be commonplace for participation to decline, sometimes markedly, rather than increase. It also appears that gambling-related problems can plateau or diminish during periods of increased availability. Additionally, although reduced consumption can be accompanied by a reduction in problems, there are instances where there is no change or an increase. These findings raise important questions for basic science as well as for public health and social policy.

The national series of gambling surveys conducted in New Zealand since 1985, including the 2012–2015 National Gambling Study (NGS) (Abbott et al. 2014a, b, 2015a), provide a unique source of information to assess changes in gambling behaviour over time and how these changes relate to the availability, total distribution and adaptation hypotheses. The 1990 and 1999 national surveys, as well as the 2012–2015 National Gambling Study, provide information on problem gambling as well as gambling.

Methods

National Gambling Study (NGS) 2012–2019

The NGS is a nationwide study that included a baseline prevalence survey and four follow-up reassessments. The baseline survey, in which 6252 adults aged 18 and older were interviewed, was conducted from March to October 2012. The survey covered all adults who lived in a private dwelling. Recruitment and interviewing were both conducted face-to-face, the latter predominantly taking place at the respondent's residential address. The sample design was a stratified three-stage cluster design, with the strata being 21 District Health Board regions, 1000 Census 2006 mesh blocks, occupied private dwellings and occupants aged 18 and older.

In part, this stratification enabled larger proportions of Maori, Pacific and Asian participants to be interviewed. Random selection procedures were used at all three levels of selection. Up to seven calls were made to each household to contact the eligible respondent. The response rate was 64%. To enable generalisation of the findings to the New Zealand adult population, each interviewed participant was given a weight that adjusted for the probability of selection at mesh block, household and individual levels. Additionally, they received a further weight to adjust for disproportions in age, gender or ethnicity relative to Census expectations.

Using computer-assisted telephone interviewing (CATI), the questionnaire collected information on demographics, residential deprivation, leisure activities, a variety of aspects of gambling participation, problem gambling [the Lifetime South Oaks Gambling Screen (Abbott and Volberg 2006; Lesieur and Blume 1987) and the Problem Gambling Severity Index (PGSI) (Ferris and Wynne 2001)], help-seeking, life events and on-going hassles, attitudes towards gambling, mental health, health conditions, substance use/misuse, quality of life and social connectedness.

The jack-knife method of producing replicated estimates was used to estimate sample errors (Rust 1985). A number of subpopulation estimates of proportions had small sample sizes or estimates. Consequently, the method proposed by Korn and Graubard (1998), and assessed in New Zealand by Gray et al. (2004), was used with two modifications to construct confidence intervals (see Abbott et al. 2014a for this and other methodological and analysis details). Univariate and multivariate regression was used to investigate the strength of associations between gambling and problem gambling measures and a wide range of other factors of interest.

The 1990 and 1999 National Prevalence Surveys

Both of these surveys, with 4053 (1990) and 6452 (1999) participants, involved random selection of households that had landline telephone numbers. The 1990 survey used random digit dialling. The 1999 survey randomly selected telephone numbers listed in current electronic white page directories. Within households, in 1990, the person aged 18 years or older who had the next birthday was selected for interview. Up to eight calls were made to each household, five to establish contact and three to the eligible resident to arrange an interview. In 1999, selection within households was made using the Kish procedure. In this survey, up to eight calls were made to each household, with up to an additional five calls made to contact the selected respondent. Interviews were conducted via telephone. The response rates for the 1990 and 1999 surveys were respectively 66 and 75%. Samples were weighted to bring them into expected population proportions for age, gender, ethnicity and household size and also correct for bias introduced by interviewing only one person per household.

The 1990 survey questionnaire included sociodemographic questions, detailed questions about past and current gambling participation and a modified version of the South Oaks Gambling Screen, the SOGS-R. This modification was made to provide a current (past 6 months) as well as a lifetime measure of probable pathological and problem gambling. The original SOGS was a lifetime measure. The foregoing measures were also included in the 1999 survey. The 1999 survey also included questions about help-seeking, other peoples' gambling problems and wellbeing.

The 1999 survey used statistical procedures to adjust confidence intervals for sample design complexity and low proportions, e.g. the probable pathological gambling estimates. This was not done in 1990. However, adjustments were subsequently made when the findings of the two

surveys were compared (see Abbott and Volberg 2000). Univariate and multivariate analyses were conducted to assess relationships between gambling, problem gambling and other factors. Subsamples of 1990 and 1999 survey participants were re-interviewed, face-to-face and in depth, within a few months of their initial interviews to provide more detailed information about gambling involvement, harms and a variety of other factors including health (Abbott 2001; Abbott and Volberg 1992). Problem gambling classification accuracy was also assessed.

The Department of Internal Affairs Surveys (1985, 1990, 1995, 2000, 2005)

These national surveys all involved random recruitment of people aged 15 and older living in private households. Interviews were conducted face-to-face. Sample size ranged from 1200 to 1672. Response rates were not always provided in survey reports. However, where they are, they ranged between 60 and 70%. Descriptions of survey methodology also vary in detail. However, in all cases, multiple attempts were made to contact selected households and the eligible resident. Samples were weighted by gender, age and household size to be representative of the New Zealand population.

Very similar questions were included in all surveys to facilitate comparison of findings over time. Some additional questions were added to the more recent surveys to take account of new forms of gambling and gather additional information on some matters. Questions concerned gambling participation, reasons for participating in particular gambling activities and attitudes towards aspects of gambling and gambling policy. These surveys did not include measures of problem gambling or other gambling-related harm. In calculating confidence intervals, adjustments were not generally made for sample complexity and low proportions. Further methodological detail is provided in the survey reports (Amey 2001; Christoffel 1992; Department of Internal Affairs 2007; Reid and Searle 1996; Wither 1987).

Results

Gambling Participation

In the 1985 DIA survey, 85% of adults reported taking part in one or more gambling activities during the past 12 months (Fig. 1). Participation increased to 90% in both 1990 and 1995 and subsequently declined to 87% in 2000 and 80% in both 2005 and 2012. In 1985, 70% of adults took part in one to three activities, decreasing to around a half in 1990, 1995, 2000 and 2005. In 2012, it increased somewhat. Participation in larger numbers of activities (four or more) increased from 15% in 1985 to 40% in 1990 and 41% in 1995. It decreased to 37% in 2000, 28% in 2005 and 22% in 2012.

Lotto was the most popular activity in terms of past 12 months participation. In 1990, 3 years after its introduction, over three-quarters of adults took part (Fig. 2). Participation reached a peak in the 1995 survey and subsequently declined in successive surveys to less than two-thirds in 2012. A similar pattern is evident for Instant Kiwi and other scratch lotteries. In 1990, 2 years after the introduction of Instant Kiwi, two-thirds had participated in the past 12 months. Participation reduced steadily in subsequent years to a third in 2012. In the case of New Zealand raffles and lotteries, around two-thirds took part in 1985, 1990, 1995 and 2000. Participation subsequently declined to less than a half in 2012. The purchase of overseas raffles

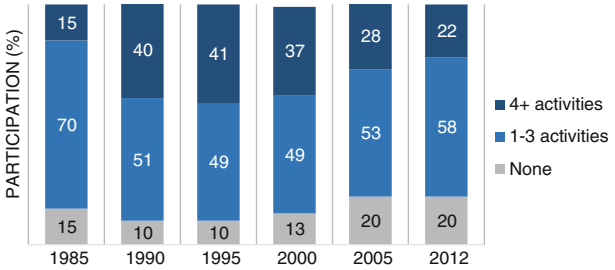

Fig. 1 Past 12 months gambling participation by number of activities (1985–2012)

and lotteries also declined over time from 10% in 2000 to 5% in 2005 and 3% in 2012. In 1995, 11% participated in keno, with participation declining in subsequent surveys (6, 3, 3%).

Past 12 months participation in informal 'casinos' for fundraising remained around one in ten from 1985 to 2000 and then reduced markedly (4% in 2005 and less than 1% in 2012). Making bets with friends and workmates increased from 1985 to 1995 and subsequently declined. In 2012, past 12 months participation in this activity was half what it had been at its

Fig. 2 Past 12 months gambling participation by activity type (1985–2012)

1995 highpoint. Betting on horse or dog races remained much the same from 1985 to 1995, with around a quarter of adults participating. It declined in subsequent surveys to an eighth in 2012. In 2000, 8% said they had bet on the outcome of a sporting event. This reduced to 4% in 2005 and was 5% in 2012. In 1985, 8% participated in housie for money. Participation in this activity was subsequently 5, 6, 4, 3 and 2%. Participating in dice games for money was mentioned by 3% in 1985 and 4, 3 and 2% in subsequent surveys. Participation was less than 1% in 2005 and 2012.

In 1990, shortly after their introduction, over a quarter of adults participated in non-casino EGMs. Participation subsequently declined steadily to half what it was in 1990. In 2000, 11% reported casino EGM participation. Participation in 2005 and 2012 was 10 and 8%, respectively. In 2000, 6% of adults reported casino table games participation. Four percent reported likewise in 2005 and 2012. Text games or competitions were mentioned by 3% in 2012 but did not feature in previous surveys.

Few gambling activities were participated in on a regular (weekly or more often) basis. Lotto is the exception, with 35% reporting this frequency of participation in 1990 and 1995. It subsequently reduced to 30% in 2000, 21% in 2005 and 17% in 2012. A similar pattern is evident for Instant Kiwi or other scratch tickets. In 1990, 14% took part. In subsequent surveys, participation declined substantially (10, 9, 6, 3%). Track betting and non-casino EGMs were the only other activities mentioned by 5% or more adults. In 1985, 5% participated weekly or more in track betting. In subsequent surveys, participation was 4, 3, 2, 3 and 1%. In 1990, 5% participated in non-casino EGMs. Subsequently, 3, 3, 3 and 1% participated.

Mention has been made of findings from the 1990 and 1999 national gambling participation and problem gambling surveys. In 1990 and 1999, respectively 90% and 86% of adults reported that they had participated in one or more gambling activities during the past 6 months. It will be recalled that the 1990 and 2000 DIA survey past 12-month estimates were 90 and 87%. In the 1990 and 1999 telephone surveys, 5 and 6% of adults respectively reported that they had never gambled. This question was also asked in the 2012 national survey. In this study, 14% said they had never gambled and a further 6% said they had gambled previously but had not during the past 12 months. In 1991 and 1999, similar percentages (6 and 8%, respectively) said they had previously gambled but not in the past 6 months. In 1991 and 1999, 41 and 46% respectively reported having gambled in the past 6 months but less than weekly. In 2012, 58% reported gambling in the past 12 months and less than weekly. In both 1991 and 1999, 30% took part in non-continuous gambling activities on a weekly or more frequent basis (Fig. 3). The 2012 estimate was 16%. Weekly or more frequent continuous gambling participation was 18% in 1991, 10% in 1999 and 6% in 2012.

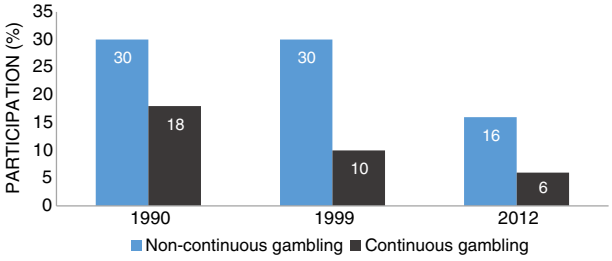

Fig. 3 Participation in continuous and non-continuous gambling activities on a weekly or more frequent basis (1990, 1999, 2012)

Problem Gambling

The 1990 national telephone survey, using the SOGS-R, estimated that 2.7% of adults were lifetime probable pathological gamblers and 4.3% were lifetime problem gamblers (Fig. 4). In 1999, the corresponding estimates were 1.0 and 1.9%, both substantially lower than in 1990. In 2012, it was estimated that there were 2.1% lifetime probable pathological and 2.4% problem gamblers. The 2012 confidence intervals for lifetime problem gambling prevalence estimate is not significantly different from the 1999 estimate and remains lower than in 1990. The 2012 lifetime probable pathological gambling estimate, however, is higher than the 1999 estimate and its confidence intervals overlap with those of the 1990 estimate.

The three survey results suggest that there was a reduction in moderate and serious lifetime problem gambling from 1990 to 1999 and an increase in serious problem gambling and plateauing in moderate problem gambling from 1999 to 2014. However, while there are similarities between the methods used in the 1990, 1999 and 2012 surveys, the 2012 survey differed in some respects from the two earlier surveys, most notably in the way participants were recruited and interviewed. Using the formula developed by Williams et al. (2012) to enable more valid comparisons to be made across studies that differ methodologically, the 2012 adjusted lifetime probable pathological and problem gambling estimates are 1.6% (CI 1.3–2.0) and 1.8% (CI 1.5–2.2). These confidence intervals overlap with those for the corresponding adjusted 1999 estimates of 1.1% (CI 0.8–1.5) and 2.1% (CI 1.5–2.7), suggesting that there was no significant change.

Discussion

The availability hypothesis proposes that increased gambling availability leads to increased participation and increased problem gambling and other gambling-related harm. According to Lund (2008), the total consumption model remains silent on the matter of relationships between availability and consumption as well as on relationships between consumption and harm. Rather, it is confined to predicting that an increase in mean consumption leads to an increase in the proportion of heavy or frequent consumers and that reducing average consumption is an effective means to reduce this proportion. Be this as it may, public health advocates have focussed on restricting availability as a major way to reduce overall consumption and have assumed that this will be effective in reducing both heavy consumption and the

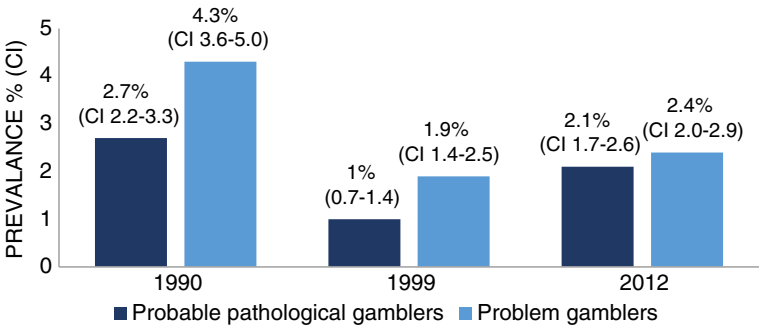

Fig. 4 Lifetime probable pathological and problem gambling prevalence (1990, 1999, 2012)

many health morbidities and other harms that are associated with heavy consumption. Reduced consumption through tighter controls over availability has become central to alcohol policy in many parts of the world including New Zealand. The Gambling Act 2003 formally adopted a public health approach. Some of the measures included in the Act, e.g. tighter regulation of EGMs and a ban on the establishment of new casinos, are intended to reduce availability.

As mentioned, the adaptation hypothesis proposes that over time novelty wears off and this and other factors lead to reduced participation, increased resilience and a decrease in problems and harm, even when availability continues to increase. While Orford (2005), among others, consider these hypotheses to be alternatives, Abbott and Shaffer from the outset proposed that they both apply, but at different stages of population exposure to gambling. Abbott (2006) and Abbott and Volberg (2000) further maintained that within complex societies they occur concurrently. For example, groups with limited prior exposure to continuous gambling, e.g. youth, recent migrants from some parts of the world and people with religions that prohibit or disapprove of gambling, are initially at high risk relative to groups that have been exposed for longer periods of time.

From 1987 to 1989, following decades of limited gambling availability, there was a major change with the introduction of Lotto, instant Kiwi and EGMS in clubs and pubs. During this period, official per capita gambling expenditure doubled. All of these newly introduced gambling activities were widely distributed and easily accessed in most communities. In 1990, just 1 to 3 years after they were introduced, over three-quarters of adults participated in Lotto during the past 12 months, two-thirds purchased Instant Kiwi tickets and over a quarter played EGMs in clubs and pubs. More than a third purchased Lotto tickets weekly. Participation rates for existing gambling activities such as raffles, card games for money, track betting and housie, either decreased slightly or stayed much the same. During this period, past year adult participation in one or more forms of gambling increased slightly. The proportion of adults who took part in four or more different gambling activities during the past year increased more markedly, almost three-fold. These results, indicating a rapid and substantial uptake of new forms of gambling and increased expenditure, are in keeping with the availability hypothesis.

As reported in the preceding section, in 1990, it was estimated that 2.7% of adults were lifetime probable pathological gamblers. A smaller number, 1.2%, were current (past 6 months) probable pathological gamblers (Abbott and Volberg 1991, 1996). Prior to the 1990 study, consistent with the conceptualisation of pathological gambling as an invariably chronic or chronically relapsing disorder, only lifetime measures had been used in clinical and general population research contexts (Abbott and Volberg 2006). The difference between lifetime and current rates suggests that about as many people had current gambling problems as there were people who had problems in the past but were not symptomatic during the past 6 months. However, it is was not known how long ago past or current problem gamblers first developed their problems or how long they persisted. Lacking this information, and given that there was no prior national prevalence survey, it is not known whether prevalence rates were lower or higher than they were prior to the 1987–1989 gambling expansion. While there had not been a national survey, pathological gambling was included in a psychiatric epidemiology study conducted in Christchurch, the major South Island city, during 1986 (Wells et al. 1989, 1992). The prevalence estimate for pathological gambling was 0.4%, substantially lower than the 1990 national estimates. However, the measure used in Christchurch had not been adequately validated and the 1986 and 1990 study designs differed. It remains uncertain

whether the apparent prevalence increase in 1990 is real or an artefact of methodological differences.

Although there was no national problem gambling prevalence study prior to 1990, participation in multiple gambling activities and weekly or more frequent participation in continuous forms of gambling are strong correlates of problem gambling in New Zealand and elsewhere (Abbott and Volberg 1991, 2000; Abbott et al. 2014b; Tu 2013). In the 1999 national study, around one in five regular non-casino EGM participants and one in ten regular track betters were current problem gamblers. In 1993, the first year that the national gambling helpline was open, the great majority of callers reported having problems primarily with either EGMs or track betting, in similar proportions (Abbott et al. 1994). By the late 1990s, proportionately more helpline callers mentioned problems with EGMs (Abbott and Volberg 2000). As mentioned, there was rapid uptake of new forms of gambling from 1987 to 1990, and the proportion of adults taking part in four or more forms increased markedly. In 1985, only two continuous gambling activities were participated in weekly or more, namely track betting (5%) and housie (2%). Weekly rates were similar for these two activities 5 years later. In that year, 23 and 5% of adults respectively reported purchasing Instant Kiwi tickets and playing non-casino EGMs weekly or more often. Although not able to measure gambling-related harm directly, these participation changes are consistent with the availability and total consumption hypotheses and suggest that gambling-related harm also very probably increased during the late 1980s. In a number of other jurisdictions, problem gambling prevalence increased in association with the expansion of gambling markets, albeit that few surveys were conducted prior to the initial expansion of commercial gambling (Williams et al. 2012).

As mentioned in the introduction, throughout the 1990s, EGM venues and numbers continued to increase and a variety of new gambling forms were established including sports betting and casinos in major metropolitan areas. Additionally, new ways of accessing track betting and lottery products were introduced. From 1990 to 2000, although annual increases in official gambling expenditure were lower than during the late 1980s, total expenditure doubled again. During this period, annual track betting and lotteries expenditure stayed much the same. Non-casino EGM expenditure increased three-fold and New Zealand-based casino expenditure increased from zero in 1994 to exceed track betting within 4 years of the establishment of the first casino.

Although availability and official gambling expenditure increased throughout the 1990s, annual participation rates in one or more gambling forms did not change from 1990 to 1995 and reduced slightly from 1995 to 2000. Similarly, past 12 months participation in four or more activities was much the same in 1990 and 1995 and reduced a little in 2000. Past 12 months participation in some activities was similar in each of the 1990, 1995 and 2000 surveys. This applied to Lotto, raffles, informal ‘casino’ evening, housie and betting with friends and workmates. Weekly Lotto participation, however, reduced somewhat in 2000. During this period, there were substantial reductions in Instant Kiwi and Keno participation as well as in playing cards for money. Non-casino EGM participation, both past 12 months and weekly or more, reduced in 1995 and again in 2000. Past 12 months casino gambling increased three-fold from 1995 to 2000; however, only 1% reported participating weekly or more. Frequent non-continuous gambling did not change from 1990 to 1999. In contrast, frequent continuous gambling reduced by almost half. With the exception of casino gambling, where participation increased in association with the introduction of casinos during the mid to late 1990s, these findings are for the most part consistent with adaptation. So too was the finding that probable pathological and problem gambling prevalence, both lifetime and current, decreased significantly from 1990 to 1999.

Contrary to the view that adaptation, if it exists, might take decades or generations, the New Zealand results indicate that substantial participation decreases can occur within the space of a few years. They also suggest that reduced problem gambling prevalence, in the presence of increasing availability, may also occur within a matter of years. While cautiously interpreted at the time, as mentioned, similar results have been obtained by surveys conducted elsewhere since the late 1990s (Williams et al. 2012). Adaptation may have taken place earlier in New Zealand than in most North American and Australian jurisdictions. The findings of an unpublished 1996 national survey are pertinent in this regard. This survey (North Health 1996) used a very similar sampling plan and methodology to the 1990 and 1999 national studies. It also employed the same problem gambling measure and the fieldwork was conducted by the same research organisation. The 1996 probable pathological and problem gambling prevalence estimates were very similar to the 1999 estimates and were substantially lower than the corresponding 1990 estimates.

While not fully articulated or understood, it is assumed that one of the contributing factors to adaptation is increased public understanding of gambling including awareness of harm associated with different gambling forms. Relative to gambling participation and problems, attitudes towards gambling have been little investigated (Orford et al. 2009). As Mond et al. (2011) note, this is surprising given that attitudes and beliefs probably influence the likelihood that people will take part in particular activities as well as the frequency of their involvement. They further note that attitudes can influence governments to introduce legislative and regulatory changes and affect decisions regarding treatment and other service provision and the uptake of these services.

Overall, most adult New Zealanders approve of gambling to raise funds for worthy causes. This has been the case since 1985. However, over time, approval of gambling for this reason has reduced. Most adults are opposed to gambling as a business enterprise or means to raise government revenue. Opposition to gambling for the latter reason has increased over time (Abbott et al. 2015a).

In 1985 and 1990, around two-thirds of adults considered one or more forms of gambling to be undesirable. In both surveys, non-casino EGMs were of most concern. In 1995, there was a substantial increase in the proportion of adults who regarded one or more forms of gambling to be undesirable. In 1995, and subsequently, concern about non-casino EGMs increased in each successive survey until 2005. Similar trends were evident for track betting and housie or bingo. Following their introduction, similar increases in concern over time were also evident for casino table games or EGMs and online gambling.

There appears to be a high level of public awareness that some gambling activities are more undesirable and harmful than others. This awareness has increased over time and public perception of the undesirability of different gambling activities has become increasingly congruent with the findings from research into their relative harmfulness (Abbott et al. 2004b, 2015a; Binde 2011).

From 1985 to 2005, there was a steady increase, in each successive survey, in the proportion of adults who agreed or strongly agreed that there is a growing problem with people being heavily involved in gambling (Abbott et al. 2015a). Of note was the proportion that agreed strongly, which rose from around one in five in 1985 to around a half in 2005. In 1985, one in five said they did not know, this reduced to one in ten in 1990 and was lower in subsequent surveys. Increased concern about problems with heavy gambling coincided with growing concern about gambling activities that are most strongly associated with gambling harm. Examination of demographic and other subgroup differences in the NGS suggests that,

for many people, attitudes about the desirability of different gambling activities are strongly influenced by their degree of gambling involvement and experience of and knowledge about gambling-related harm. For others, it appears that their attitudes are more influenced by moral or religious objections to gambling (Abbott et al. 2015a). These changes in attitudes may have contributed to reductions in gambling participation, including regular participation in high-risk forms and problem gambling. They may also have contributed to government decisions to provide funding for problem gambling services and to aspects of the Gambling Act 2003.

Since 1999, another casino was established, additional gambling activities were introduced and internet access was provided to lottery products, track and sports betting. Accessing offshore internet gambling sites remained legal. Until 2004, EGM venues and numbers continued to increase, as did overall official gambling expenditure. As mentioned in the introduction, since 2004, EGM venues, numbers and revenue decreased, as did overall inflation-adjusted official gambling expenditure. This levelling off in expenditure or market maturation has occurred in some other jurisdictions (Productivity Commission 2010). Maturation does not mean stagnation. Industry sectors continued to pursue opportunities to grow new markets and introduce new or modified gambling products. Online gambling sites and offerings proliferated globally, and gambling and gambling-like activities became more accessible through mobile and smart phones (Global Betting and Consultants 2014).

From 2000 to 2005, there was an increase in the proportion of adults who did not gamble during the past year, to below that of 1985, and this level of non-participation persisted in 2012. In 2012, relative to 1991 and 1999, there was also an increase in the proportion of adults who had never gambled. Across the 2000, 2005 and 2012 surveys, there were reductions in past year participation in almost all gambling forms. Additionally, there was a substantial reduction in the proportion that participated in four or more different activities. Weekly or more frequent participation also reduced. Similar differences were found when the 2012 participation findings were compared with the findings from the 1999 national study. Whereas there was no change in the proportion of regular non-continuous gamblers from 1990 to 1999, the proportion almost halved from 1999 to 2012. The proportion of regular continuous gamblers also decreased by about a half, having previously decreased from 1991 to 1999. In 2012, the proportion of adults that took part weekly or more often in continuous forms of gambling was a third of what it was in 1991.

Although gambling participation rates decreased substantially since the 1999 and 2000 surveys and proportionately fewer people engaged in multiple activities, lifetime probable pathological gambling prevalence either increased, or remained unchanged in 2012, depending on whether adjustment is made for the differences in the way participants were recruited and interviewed. There was no change from 1999 to 2012 in lifetime problem gambling. These results are similar to those of the Swedish and Victorian studies mentioned previously (Abbott et al. 2014c, 2015d). In both cases, there were substantial reductions in gambling participation, across virtually all demographic groups, and current problem gambling prevalence did not change. In Sweden, as in New Zealand, lifetime probable pathological gambling estimates, but not lifetime problem estimates, were higher in the more recent study. This pattern of reduced participation and plateauing of problems is not confined to New Zealand, Victoria and Sweden (Department of Justice and Attorney-General 2012; Wardle et al. 2011). The findings of other New Zealand surveys conducted since the mid-2000s [New Zealand Health Surveys in 2006/2007 and 2011/2012 (Ministry of Health 2009; Rossen 2015); Health and Lifestyle Surveys of 2010 and 2012 (Gray 2011; Tu 2013)] are consistent with the findings discussed, increasing

confidence in their validity and reliability (Abbott et al. 2015b; Walker et al. 2012). These studies used current measures of problem gambling.

In summary, in 1990, following a few years of unprecedented increase in gambling availability and expenditure, the first problem gambling survey was conducted in New Zealand. The prevalence rates were substantially higher than in any subsequent survey. During the 1990s, a period when availability and expenditure continued to grow, participation decreased, particularly regular participation in continuous gambling forms. This finding is contrary to the availability hypothesis but consistent with adaptation. Problem gambling prevalence rates also fell. This reduction is consistent with the availability and the adaptation hypotheses as both predict a decline in gambling-related harm if participation reduces. Subsequent to 1999, while availability continued to increase, participation fell further, in many cases more rapidly than during the 1990s. This reduction applied to regular continuous and non-continuous gambling as well as to involvement in multiple forms. During this period, total inflation-adjusted gambling expenditure reduced by a fifth. In contrast to the 1990s, problem gambling prevalence did not decrease. It appears to have plateaued. While requiring further consideration, these results appear to be consistent with total consumption theory in that overall participation and expenditure reductions were accompanied by decreases in the proportion of adults engaged in heavy consumption (regular continuous gambling and participation in multiple activities). They are contrary to the availability and the adaptation hypotheses in that these substantial reductions in gambling participation and expenditure were not associated with lower problem gambling prevalence rates.

Following the introduction of the Gambling Act 2003, a number of regulatory and public health measures were initiated to address the legislation's objectives including the reduction of gambling harm. From 2004 onwards, non-casino EGM venues and numbers fell steadily. Gambling helpline and treatment services expanded and client numbers increased. Although it is often claimed that only a small proportion of problem gamblers seek specialist or other forms of help, this is no longer the case in New Zealand. In 2011, the helpline and gambling counselling services respectively saw 1242 and 4657 new cases. A substantial number also received brief interventions from gambling counselling providers and accessed other health, addictions and social services (Abbott et al. 2014b). While some clients receive more than one type of intervention, it appears that moderate to large proportions of New Zealand's estimated new cases of problem gambling (approximately 8000 per annum) and current problem gamblers (approximately 23,500) receive formal help in any given year (Abbott et al. 2014b, 2015b). Evaluations including an outcome study and clinical trial indicate that around two-thirds of clients maintain clinically significant reductions in gambling and related problems 12 months after making contact with services (Abbott et al. 2012, 2013, 2015c, e).

Abbott (2006) proposed that regulatory and public health measures can accelerate adaptation and contribute to reduced gambling-related harm. The post 2003 regulatory and public health initiatives and service expansion may have played a role in decreasing gambling participation and expenditure. Helpline and treatment interventions undoubtedly assisted substantial numbers of people, both problem gamblers and people within their social networks and wider society. While problem gambling and presumably other gambling-related harm has apparently not decreased since 1999, it cannot be concluded that post 2003 Gambling Act initiatives failed to have a positive impact. It is possible that problems might have increased in their absence. What can be concluded is that neither these initiatives nor the continued fall in gambling participation and expenditure has been accompanied by further reductions in problem gambling and related harm. It is important to understand why this was the case.

A number of factors additional to gambling exposure and participation contribute to problem gambling prevalence. In all New Zealand problem gambling surveys, including the initial 1990 study and NGS, Maori and Pacific people have substantially higher prevalence rates than other New Zealanders. In the NGS baseline survey, males, young adults, people who lack formal qualifications, unemployed people, people living in high deprivation neighbourhoods and people belonging to non-Christian religions or non-traditional Christian churches were also at elevated risk (Abbott et al. 2014b). While Maori have both high gambling participation and prevalence rates, Pacific people and a number of the other high-risk groups have relatively low participation rates.

Most of the high-risk groups live disproportionately in neighbourhoods that, in addition to being deprived, contain high concentrations of EGMs (in pubs and clubs) and track and sports betting venues (Allen + Clarke 2015). New Zealand research has shown that residential proximity to gambling venues is associated with higher problem gambling prevalence (Ministry of Health 2008). Many people in these groups have had relatively limited prior gambling experience and are disadvantaged economically and in other ways. It is likely that the combination of heightened vulnerability and heavy gambling exposure is contributing to the persistence of high rates of problem gambling and related harm.

New Zealand is changing demographically. It is ageing and the proportions of Maori, Pacific and Asian people are increasing. Immigration rates are high and many recent migrants come from countries where access to EGMs and other continuous forms of gambling is limited. It is unclear to what extent these and other demographic changes have contributed to problem gambling prevalence, including its apparent plateauing during the past 10 to 15 years. While beyond the scope of the present paper, this requires examination. In the future, consideration could be given to using both standardised and unstandardised rates.

Prevalence is determined both by the inflow of new problem gamblers (incidence) and the outflow (through recovery, remission, migration and death). It has only been in the past few years that large-scale general population studies have provided problem gambling incidence estimates (Abbott et al. 2015b; Billi et al. 2014; Public Health Agency of Sweden 2016). From 2012 to 2013, 0.28% of New Zealand adults developed a serious gambling problem (Abbott et al. 2015b). This is approximately half the past 12 months problem gambling prevalence rate. While there was no change in problem gambling prevalence from 2012 to 2013, around half were different people. The outflow of problem gamblers to non-problem and lower risk gambling categories was matched by the inflow of new problem gamblers. Of the 'new' problem gamblers (people who did not have current problems in 2012 but who developed problems during the next 12 months), approximately half reported having problems in the more distant past. Because the lifetime measure used in other study is known to under-detect past problems (Abbott et al. 2004a, b), it is likely that as many as two-thirds of 'new' problem gamblers are actually problem gamblers who are relapsing.

It is expected that during the initial phase of gambling expansion, most people who developed problems were developing them for the first time and that the main driver of increased prevalence was a rise in incidence. As populations and population sectors adapt and prevalence rates fall, it seems probable that declining incidence plays an important part. It is proposed that subsequently, when gambling participation continues to decline but problem gambling prevalence plateaus, this is in part a consequence of an accumulation of past problem gamblers who are at high risk for relapse. For some high-risk population sectors however, including those recently exposed to high concentrations of continuous gambling forms, it is anticipated that most incident cases will be first time problem gamblers. These matters require

investigation in future studies. Their findings will have important implications for policy, prevention and treatment.

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Compliance with Ethical Standards

Conflict of Interest The author declares that he has no conflicts of interest.

Ethical Standard The National Gambling Study received ethical approval from the Northern Y Regional Ethics Committee of the Health and Disability Ethics Committee on 26 May 2011 (Reference: NTY/11/04/040).

References

Abbott, M. W. (2001). *Problem and non-problem gamblers in New Zealand: a report on phase two of the 1999 National Prevalence Survey. Report number six of the New Zealand Gaming Survey*. Wellington: Department of Internal Affairs.

Abbott, M. W. (2006). Do EGMs and problem gambling go together like a horse and carriage? *Gambling Research: Journal of the National Association for Gambling Studies (Australia), 18*(1), 7–38.

Abbott, M. W. (2007). Situational factors that affect gambling behavior. In G. Smith, D. C. Hodgins, & R. J. Williams (Eds.), *Research and measurement issues in gambling studies* (pp. 251–278). Boston: Academic.

Abbott, M. W., & Volberg, R. A. (1991). *Gambling and problem gambling in New Zealand. Research series no. 12*. Wellington: Department of Internal Affairs.

Abbott, M. W., & Volberg, R. A. (1992). *Frequent and problem gambling in New Zealand. Research series no. 14*. Wellington: Department of Internal Affairs.

Abbott, M. W., & Volberg, R. A. (1996). The New Zealand National Survey of problem and pathological gambling. *Journal of Gambling Studies, 12*(2), 143–160.

Abbott, M. W., & Volberg, R. A. (1999). *Gambling and problem gambling in the community: an international overview and critique. The New Zealand Gaming Survey. Report no. 1*. Wellington: Department of Internal Affairs.

Abbott, M. W., & Volberg, R. A. (2000). *Taking the pulse on gambling and problem gambling in New Zealand: a report on phase one of the 1999 National Prevalence Survey (report number three of the New Zealand Gaming Survey)*. Wellington: Department of Internal Affairs.

Abbott, M. W., & Volberg, R. A. (2001). *What do we know about gambling and problem gambling in New Zealand? Report No. 7 of the New Zealand Gaming Survey*. Wellington: Department of Internal Affairs.

Abbott, M. W., & Volberg, R. A. (2006). The measurement of adult problem and pathological gambling. *International Gambling Studies, 6*(2), 175–200.

Abbott, M. W., Sullivan, S., & McAvoy, B. (1994). *The compulsive gambling of New Zealand national telephone helpline and clinics: report on their first year of operation*. Auckland: Compulsive Gambling Society of New Zealand.

Abbott, M. W., Williams, M., & Volberg, R. A. (1999). *Seven years on: a follow-up study of frequent and problem gamblers living in the community. Report no. 2 of the New Zealand Gaming Survey*. Wellington: Department of Internal Affairs.

Abbott, M., Volberg, R., Bellringer, M., & Reith, G. (2004a). *A review of research on aspects of problem gambling: final report*. London: Responsibility in Gambling Trust.

Abbott, M. W., Williams, M. M., & Volberg, R. A. (2004b). A prospective study of problem and regular nonproblem gamblers living in the community. *Substance Use & Misuse, 39*(6), 855–884.

Abbott, M., Bellringer, M., Vandal, A., Hodgins, D., Palmer Du Preez, K., Landon, J., et al. (2012). *Effectiveness of problem gambling brief telephone interventions: a randomised controlled trial*. Auckland: Gambling and Addictions Research Centre, Auckland University of Technology. Prepared for Ministry of Health.

Abbott, M., Bellringer, M., Garrett, N., Vandal, A., Hodgins, D., Palmer Du Preez, K., et al. (2013). *Effectiveness of problem gambling brief telephone interventions: an uncontrolled outcome study*. Auckland: Gambling and Addictions Research Centre, Auckland University of Technology. Prepared for Ministry of Health.

Abbott, M., Bellringer, M., Garrett, N., & Mundy-McPherson, S. (2014a). *New Zealand 2012 National Gambling Study: overview and gambling participation. Report number 1*. Auckland: Auckland University of Technology, Gambling and Addictions Research Centre. Prepared for Ministry of Health.

Abbott, M. W., Romild, U., & Volberg, R. A. (2014b). Gambling and problem gambling in Sweden: changes between 1998 and 2009. *Journal of Gambling Studies, 30*(4), 985–999.

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

Abbott, M., Bellringer, M., Garrett, N., & Mundy-McPherson, S. (2015a). *New Zealand 2012 National Gambling Study: attitudes towards gambling. Report number 3*. Auckland: Gambling and Addictions Research Centre, Auckland University of Technology. Prepared for Ministry of Health.

Abbott, M., Bellringer, M., Garrett, N., & Mundy-McPherson, S. (2015b). *New Zealand 2012 National Gambling Study: wave 2 (2013). Report number 4*. Auckland: Auckland University of Technology, Gambling and Addictions Research Centre. Prepared for Ministry of Health.

Abbott, M., Bellringer, M., Palmer Du Preez, K., Pearson, J., Vandal, A., Garrett, N., & Hodgins, D. (2015c). *Randomised controlled trial of problem gambling brief telephone interventions: three years later*. Auckland: Gambling and Addictions Research Centre, Auckland University of Technology. Prepared for Ministry of Health.

Abbott, M., Stone, C. A., Billi, R., & Yeung, K. (2015d). Gambling and problem gambling in Victoria, Australia: Changes over 5 years. *Journal of Gambling Studies, 32*(1), 47–78.

Abbott, M., Bellringer, M., Palmer Du Preez, K., Maheswaran, M., Garrett, N., Landon, J., & Hodgins, D. (2015e). *An outcome study of a problem gambling brief telephone intervention: three years later*. Auckland: Gambling and Addictions Research Centre, Auckland University of Technology. Prepared for Ministry of Health.

Allen + Clarke. (2015). *Informing the 2015 gambling harm needs assessment: final report for the Ministry of Health*. Wellington: Allen & Clarke Policy and Regulatory Specialists Limited.

Amey, B. (2001). *People's participation in and attitudes to gaming 1985–2000: final results of the 2000 survey*. Wellington: Department of Internal Affairs.

Billi, R., Stone, C. A., Marden, P., & Yeung, K. (2014). *The Victorian Gambling Study: a longitudinal study of gambling and health in Victoria, 2008–2012*. Victoria: Victorian Responsible Gambling Foundation.

Binde, P. (2011). *What are the most harmful forms of gambling? Analyzing problem gambling prevalence surveys*, *Center for Public Sector Research (CEFOS) working papers 12*. Gothenburg: University of Gothenburg.

Bogart, W. A. (2011). *Permit but discourage: regulating excessive consumption*. New York: Oxford University Press, Inc..

Christoffel, P. (1992). *Peoples' participation in and attitudes towards gambling*. Wellington: Department of Internal Affairs.

Department of Internal Affairs. (2007). *People's participation in, and attitudes to, gambling, 1985–2005: results of the 2005 survey*. Wellington: Department of Internal Affairs.

Department of Justice and Attorney-General. (2012). *Queensland household gambling survey 2011–2012*. Brisbane: State of Queensland.

Dowling, N., Smith, D., & Thomas, T. (2005). Electronic gaming machines: are they the 'crack-cocaine' of gambling? *Addiction, 100*(1), 33–45.

Ferris, J., & Wynne, H. (2001). *The Canadian Problem Gambling Index: final report*. Ottawa: Canadian Centre on Substance Abuse.

Gambling Review Body. (2001). *Gambling review report*. Norwich: The Stationary Office.

Global Betting, & Consultants, G. (2014). *Change is on the cards: technology, tourism and taxes drive global gambling*. Castletown: Global Betting and Gaming Consultants.

Grant, D. (1994). *On a roll: a history of gambling and lotteries in New Zealand*. Wellington: Victoria University Press.

Gray, R. (2011). *New Zealanders' participation in gambling: results from the 2010 Health and Lifestyles Survey*. Wellington: Health Sponsorship Council.

Gray, H. G., Haslett, S. H., & Juzmicich, G. S. (2004). Confidence intervals for proportions estimated from complex sample designs. *Journal of Official Statistics, 20*(4), 705–723.

Hare, S. (2015). *Study of gambling and health in Victoria*. Victoria: Victorian Responsible Gambling Foundation and Victorian Department of Justice and Regulation.

Korn, E. L., & Graubard, B. I. (1998). Confidence intervals for proportions with very small expected number of positive counts estimated from survey data. *Survey Methodology, 24*(2), 193–201.

Ledermann, S. (1956). *Alcoolisme, Alcoolisation: Donnees Scientifiques de Caractere Physiologique, Economique et Social*. Paris: Presses Universitaires de France.
Lesieur, H. R., & Blume, S. B. (1987). The South Oaks Gambling Screen (SOGS): a new instrument for the identification of pathological gamblers. *American Journal of Psychiatry, 144*(9), 1184–1188.
Lund, I. (2008). The population mean and the proportion of frequent gamblers: is the theory of total consumption valid for gambling? *Journal of Gambling Studies, 24*(2), 247–256.
Ministry of Health. (2005). *Preventing and minimising gambling harm: six-year strategic plan 2010/11–2015/16*. Wellington: Ministry of Health.
Ministry of Health. (2007). *Preventing and minimising gambling harm: three-year service plan 2007–2010*. Wellington: Ministry of Health.
Ministry of Health. (2008). *Raising the odds? Gambling behaviour and neighbourhood access to gambling venues in New Zealand*. Wellington: Ministry of Health.
Ministry of Health. (2009). *A focus on problem gambling: results of the 2006/07 New Zealand Health Survey*. Wellington: Ministry of Health.
Ministry of Health. (2010a). *Preventing and minimising gambling harm: six-year strategic plan 2010/11–2015/16*. Wellington: Ministry of Health.
Ministry of Health. (2010b). *Preventing and minimising gambling harm three-year service plan 2010/11–2012/13*. Wellington: Ministry of Health.
Ministry of Health. (2013). *Preventing and minimising gambling harm: Three-year service plan and levy rates for 2013/14 to 2015/16*. Wellington: Ministry of Health.
Mond, J., Davidson, T., & McAllister, I. (2011). *Public opinion on gambling*. Canberra: Australian National Institute for Public Policy and ANU College of Arts and Social Sciences.
National Research Council. (1999). *Pathological gambling: a critical review*. Washington: National Academy Press.
New Zealand Government. (2013). *Gambling Act 2003 (Public Act 2003 No 51)*. Wellington: The New Zealand Government.
North Health. (1996). *Interim report on problem gambling management*, *Prepared for Committee on Problem Gambling Management*. Auckland: North Health.
Orford, J. (2005). Disabling the public interest: Gambling strategies and policies for Britain. *Addiction, 100*(9), 1219–1225.
Orford, J., Griffiths, M., Wardle, H., Sproston, K., & Erens, B. (2009). Negative public attitudes towards gambling: Findings from the 2007 British Gambling Prevalence Survey using a new attitude scale. *International Gambling Studies, 9*(1), 39–54.
Productivity Commission. (1999). *Australia's gambling industries, report no. 10*. Canberra: AusInfo.
Productivity Commission. (2010). *Gambling, report no. 50*. Canberra: Commonwealth of Australia.
Public Health Agency of Sweden. (2016). *Gambling and gambling problems in Sweden 2008–2010: Swedish Longitudinal Gambling Study. Swelogs findings from wave one and wave two*. Östersund: Public Health Agency of Sweden.
Reid, K., & Searle, W. (1996). *Public participation in and attitudes towards gambling: final results of the 1995 survey (research series no. 22)*. Wellington: Department of Internal Affairs.
Rose, G., & Day, S. (1990). The population mean predicts the number of deviant individuals. *British Medical Journal, 301*(6759), 1031–1034.
Rossen, F. (2015). *Gambling and problem gambling: results of the 2011/12 New Zealand Health Survey*. Auckland: Centre for Addiction Research, Auckland UniServices Limited, The University of Auckland. Prepared for the Ministry of Health.
Rust, K. (1985). Variance estimation for complex estimators in sample surveys. *Journal of Official Statistics, 1*(4), 381–397.
Sassen, M., Kraus, L., & Buhringer, G. (2011). Differences in pathological gambling prevalence estimates: facts or artefacts? *International Journal of Methods in Psychiatric Research, 20*(4), e83–e99.
Shaffer, H. J., Hall, M. N., & Bilt, J. V. (1997). *Estimating the prevalence of disordered gambling behavior in the United States and Canada: a meta-analysis*. Cambridge: Harvard Medical School Division on Addictions.
Storer, J., Abbott, M., & Stubbs, J. (2009). Access or adaptation? A meta-analysis of surveys of problem gambling prevalence in Australia and New Zealand with respect to concentration of electronic gaming machines. *International Gambling Studies, 9*(3), 225–244.
The Economist (2014). *The house wins*. Retrieved from http://www.economist.com/blogs/graphicdetail/2014/02/daily-chart-0?fsrc=scn/tw/te/dc/thehousewins. Accessed 17 May 2016.
Tu, D. (2013). *New Zealanders' participation in gambling: results from the 2012 Health and Lifestyles Survey*. Wellington: Health Promotion Agency.
Vasiliadis, S. D., Jackson, A. C., Christensen, D., & Francis, K. (2013). Physical accessibility of gaming opportunity and its relationship to gaming involvement and problem gambling: a systematic review. *Journal of Gambling Issues, 28*, 1–46 Retrieved from http://jgi.camh.net/doi/full/10.4309/jgi.2013.28.2.

Volberg, R. A., & Abbott, M. W. (1994). Lifetime prevalence estimates of pathological gambling in New Zealand. *International Journal of Epidemiology, 23*(5), 976–983.

Volberg, R. A., Dickerson, M., Ladouceur, R., & Abbott, M. W. (1996). Prevalence studies and the development of services for problem gamblers and their families. *Journal of Gambling Studies, 12*(2), 215–231.

Walker, S. E., Abbott, M. W., & Gray, R. J. (2012). Knowledge, views and experiences of gambling and gambling-related harms in different ethnic and socio-economic groups in New Zealand. *Australian & New Zealand Journal of Public Health, 36*(2), 153–159.

Wardle, H., Moody, A., Spence, S., Orford, J., Volberg, R., Jotangia, D., & Dobbie, F. (2011). *British gambling prevalence survey 2010*. London: National Centre for Social Research.

Wells, J. E., Bushnell, J. A., Hornblow, A. R., Joyce, P. R., & Oakley-Brown, M. A. (1989). Christchurch psychiatric epidemiology study part 1: methodology and lifetime prevalence for specific disorders. *Australian and New Zealand Journal of Psychiatry, 23*(2), 215–226.

Wells, J. E., Bushnell, J. A., Joyce, P. R., Oakley-Brown, M. A., & Hornblow, A. R. (1992). Problems with alcohol, drugs and gambling in Christchurch, New Zealand. In M. Abbott & K. Evans (Eds.), *Alcohol measuring problem and pathological gambling and drug dependence and disorders of impulse control*. Auckland: Mental Health Foundation of New Zealand.

Wildman, R. (1998). *Gambling: an attempt at an integration*. Edmonton: Wynne Resources.

Williams, R., & Volberg, R. (2009). Impact of survey description, administration format, and exclusionary criteria on population prevalence rates of problem gambling. *International Gambling Studies, 9*(2), 101–117.

Williams R.J., Volberg R.A., Stevens R.M.G. (2012). *The population prevalence of problem gambling: methodological influences, standardized rates, jurisdictional differences, and worldwide trends*. Prepared for the Ontario Problem Gambling Research Centre and the Ontario Ministry of Health and Long Term Care. Lethbridge: University of Lethbridge. Northhampton: Gemini Research.

Wither, A. (1987). *Taking a gamble: a survey of public attitudes towards gambling in New Zealand*. Wellington: Department of Internal Affairs.