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Gambling Participation, Expenditure and Risk of Harm in Australia, 1997–1998 and 2010–2011

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Abstract Gambling-related harm results primarily from financial losses. Internationally Australia continues to rank as the largest spending nation per capita on gambling products. This would suggest that Australian gamblers are at disproportionately high risk of harm despite almost two decades of industry scrutiny and regulation, and investment in research, treatment and education programs. However, declines in participation rates, per capita expenditure, household expenditure, national disposable income spent on gambling and problem gambling rates have been cited as evidence that fewer people are gambling, that gamblers are spending less, and that gambling safety in Australia has improved. The current study investigated these propositions using national population and accounts data, and statistics from Australia's two population-representative gambling surveys conducted in 1997–1998 and 2010–2011. Despite a falling participation rate the study found no real change in the number of people gambling overall, and increasing numbers consuming casino table games, race wagering and sports betting. Further found were increases rather than decreases in average gambler expenditure, overall, and across most products, particularly electronic gaming machines (EGMs). Potentially risky levels of average expenditure were observed in both periods, overall and for race wagering, casino table gaming, and EGMs. Changes in the proportion of income spent on gambling suggest risks declined overall and for race wagering and casino table gaming, but increased for EGMs. Finally, while problem gambling statistics were not comparable between periods, the study found double the number of moderate risk gamblers previously estimated for 2010–2011 amongst

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the 2 million Australians found to have experienced one or more gambling-related problems. The findings have implications for public health policy and resourcing, and the way in which prevalence and expenditure statistics have been interpreted by researchers, government and industry in Australia and elsewhere.

Keywords Expenditure · Participation · Prevalence · Problem gambling · PGSI · Australia · Adaptation · Harm minimisation · Policy · Public health · Government · EGM · Gaming machine · Sports betting · Horse racing · Casino

Introduction

Harms experienced as a result of gambling continue to cause concern globally. Australia regularly ranks as the largest spending nation per capita on gambling products in the world (The Economist online, 2011, 2014, 2017), and record level revenues continue to be reported by the gambling industry (Queensland Government Statistician's Office 2016). Electronic gaming machines (EGMs), casino gaming, and race wagering together account for almost ninety percent of money spent on gambling in Australia, and all three products are associated with a greater likelihood of participation and expenditure leading to gambling problems when compared to other products (Abbott et al. 2015; Binde 2011; Davidson et al. 2016; Dowling et al. 2015; Gainsbury et al. 2014; Markham et al. 2016).

However, it is not known how many Australians actually gamble on these as well as other less risky products. Nor is it known how much consumers spend on average, or what proportion of their income this constitutes, or how many experience adverse consequences. Such knowledge is fundamental to monitoring national gambling activity, developing and evaluating harm reduction policy and regulation, and efficiently investing resources into relevant public health strategies and services. Statistics from two national, population representative surveys provide an opportunity to derive the most recent answers in the Australian context (Gainsbury et al. 2015; Productivity Commission 1999). They have the potential to show how trends have changed in the 14 years since gambling-related problems were first quantified as a problem of national significance, and where gambling activity may be headed.

Access to gambling products in Australia, as in many countries, increased markedly in the 1990's. The liberalization of gambling in most states and territories saw substantial industry growth—particularly in EGMs and casinos – as well as adverse impacts on many Australians and their families. The community concern that followed led to the first national public inquiry, which included a population survey of gambling behavior, impacts and attitudes. The inquiry found that most gambling-related harms resulted from the impacts of gambling losses, including financial hardship, adverse effects on family relationships, physical and mental health problems, productivity and employment problems, and crime and legal problems. Gambling was viewed as hazardous by the public. Most people surveyed agreed that gambling did more harm than good and opposed any further increase in the number of EGMs (Productivity Commission 1999).

State and territory governments responded by giving much greater emphasis to regulating gambling within their jurisdictions in efforts to prevent problem gambling. They also funded counselling and treatment problems to assist problem gamblers, and public education programs to raise awareness of the risks (Australian Department of Social Services 2010). The industry subsequently became one of the most heavily regulated in Australia. More than sixty pieces of legislation underpin the regulatory environment, reflecting

variation in product mixes and attitudes across the states (O'Farrell 2015). Together these regulations and programs broadly represent the governments' willingness to reach some kind of balance between minimizing economic harm to the gambling industry while concurrently minimizing gambling-related harm to individuals, communities and society.

In order to monitor related changes in participation and problem rates, the states and territories have independently undertaken numerous population-representative gambling surveys. However, methodological differences have greatly limited the comparability of data and findings between the surveys. These include variation in data collection methods, sampling and sample size, intervals between surveys, and differences in outcome measures. These differences have made it difficult to evaluate regulatory and program impacts within the states and territories as well as between them. Accordingly, there are major evidence gaps as to their effectiveness (Livingstone et al. 2014; Productivity Commission 1999, 2010).

These differences have had the added effect of making it difficult to establish a consistent and coherent picture of changes in Australian gambling participation, spending, and problem gambling. This has presented difficulties for the Australian government over the past decade, for instance in measuring the performance of its national gambling help services (Australian Government 2013; Parliamentary Joint Select Committee on Gambling Reform 2011), and developing an evidence-based public health approach to minimizing risk behaviour (Australian Government, 2016; Parliamentary Joint Select Committee on Gambling Reform 2012). Reflecting these issues, gambling research has been recognized in principle as a National Health Priority Area (Australian Government, 2013), and as essential to the development of effective policy and deployment of public health resources (Australian Government, 2016).

To date, two national gambling surveys with comparable methodologies and sample size have been performed to estimate the extent of gambling participation. The first covered 1997–1998 (Productivity Commission 1999) and the second 2010–2011 (Gainsbury et al. 2015). The first estimated an annual adult participation rate of 82% and the second 64%. This reflected a 21% reduction in the overall participation rate and lower rates across all major products except sports betting over the 14-year period. The second national survey investigators concluded that "fewer Australian adults gambled in 2011 than in 1998–1999" (Gainsbury et al. 2015) (p. 11). Declines in state participation rates recorded at varying intervals over this period of up to 24% underlay this downward national trend (Allen Consulting Group, 2011).

Industry expenditure data, Australian National Accounts data and Household Expenditure Survey data collected during the same period showed parallel declines.[1] These showed an overall reduction of 5% in real gambling expenditure per capita, a reduction in the proportion of total Australian household disposable income spent on gambling products from 2.9 to 2% (Queensland Government Statistician's Office 2014), and a reduction in self-reported average annual household expenditure on gambling from $455 to $329 (Australian Bureau of Statistics 2000, 2010).

Evidence from Canada, Finland, Norway and Australia has shown that lower spending is associated with reduced risk of gambling problems (Markham et al. 2016). Emerging research suggests that problems begin to manifest when personal annual spending passes around AU$450-500 (Currie et al. 2008; Currie et al. 2006; Dowling et al. 2016), or 1.6% of personal disposable income (Dowling et al. 2016). Australian trends therefore suggest a

[1] All expenditure figures in this article are standardized to 2012-13 AU dollars.

shift in interest and consumption away from gambling activities and a reduction in potentially harmful levels of gambling since the first national inquiry.

In further evidence of this, the Productivity Commission's (2010) second national gambling inquiry suggested a decline in problem gambling prevalence rates over this period. Notwithstanding methodological variations between the state surveys, the Commission's assessment of state data between 2001 and 2009 suggested that, on balance, problem gambling prevalence had fallen. By transforming the mean of all state problem gambling prevalence rates reported in this period into national population numbers, the Commission estimated that there were around 116,000 problem gamblers and 279,000 moderate risk gamblers as of June 2009.

The Commission concluded that any decline over the period was likely a result of diminished participation on EGMs, adaption by Australians to the risks of gambling, and government policies and actions by venues. The Commission's ageing numbers and conclusions continue to be used to describe the current extent of gambling problems in Australia and to focus gambling policy and resources towards this relatively small high-risk gambling population (Australian Department of Social Services 2014; Australian Government, 2015, 2016; The Liberal Party and the National Party of Australia 2013).

Representatives of Australia's largest gambling industries have argued on the basis of one or more of these declines that existing regulations and initiatives pertaining to EGMs and casino gaming are likely now adequate (Australasian Casino Association 2009; Australian Hotels Association, 2009; Australian Leisure and Hospitality Group, 2009; Clubs Australia, 2009; Clubs NSW, 2009). Some have further argued that current regulations are putting the future of the EGM industry in hotels and clubs at risk (Australian Hotels Association, 2009; Australian Hotels Association (Victoria) 2016; Australian Leisure and Hospitality Group, 2009, 2012, 2016a, 2016b). They emphasize an already-uncertain future for their industry stemming from the loss of customers and market share to casinos, lotteries, sports betting, online gambling in particular, other non-gambling recreational activities, and decreased interest in the current forms of EGMs.

As such, government advisors and Australia's largest industry groups have suggested that gambling safety in Australia has likely improved since the considerable concerns expressed in the first national inquiry. It would appear that Australians are gambling in a safer environment, are themselves gambling more safely, and that the status of gambling as a public health issue is improving.

In this paper we provide a very different perspective on the foregoing statistics and the conclusions to which they lead. We build on publically available data to show that such a focus in the formation of related public health policy can be misleading.

The first aim of our study was to estimate how many Australians gamble, what they gamble on, and whether this changed between the two national surveys. The second aim was to estimate how much gamblers spent on average overall and on each product, the proportion of average disposable income this constituted, and to examine whether this changed between the two national surveys. The third aim was to use the problem gambling rates reported in the most national recent survey to estimate the number of Australians with gambling problems. We contrast our findings with the declines in participation rates and expenditure figures emphasized in previous studies and reports, and with the Commission's estimates of the number of people with gambling problems.

Method

Analyses

Our statistics were derived from analyses and extrapolation of secondary data from publically available sources. First, we applied national population figures to the participation rates reported in the two national studies to estimate the number of gamblers in each period and whether this changed between 1997–1998 and 2010–2011.

Second, we used these participation numbers in conjunction with annual industry revenue data to estimate average spend per gambler in each period. Third, using national accounts data, we estimated the proportion of per capita disposable income accounted for by average gambling expenditure in each period. We compare these average gambling expenditure estimates to average consumer expenditure estimates on a selection of essential and non-essential goods.

We similarly applied population figures to the 2010–2011 problem gambling prevalence rates to estimate how many Australians experienced gambling problems. Rates reported in the 1997–1998 national survey were not transformed into comparable population numbers because they were estimated using the South Oaks Gambling Survey (SOGS) which surveys gambling-related problems over the lifetime (Lesieur & Blume 1987) rather than Problem Gambling Severity Index which surveys gambling-related problems in the past year (PGSI) (Ferris and Wynne 2001). These and other differences in content and scoring thresholds render the published prevalence figures incomparable (Productivity Commission 2010).

Secondary Data Sources

Gambling Data

National gambling participation rates for 1997–1998 were extracted from the National Gambling Survey (Productivity Commission 1999). Commissioned by the Australian Government and conducted in 1999, this was a representative computer-assisted telephone gambling survey (CATI) survey of 10,609 Australians' gambling activities, attitudes and gambling problems in the preceding 12 months.

National participation and problem gambling rates for 2010–2011 were extracted from publications surrounding the Interactive Gambling study (Gainsbury et al. 2014, 2015; Hing et al. 2014). Commissioned by Gambling Research Australia and conducted in 2011, this was a representative CATI survey of 15,006 Australians' gambling activities, interactive gambling preferences, attitudes, and gambling problems in the preceding 12 months.

Gambling financial data for 1997–1998 and 2010–2011 were extracted from Australian Gambling Statistics (AGS) (Government Statistician & Queensland Treasury and Trade, 2014) for each product, including aggregate and per capita expenditure. AGS is the official collection of Australian financial data on legalized regulated gambling. The amount lost in a wager defines expenditure and is the gross revenue or profit of the gambling operator.

Note that casino revenue reported in AGS is an aggregate figure primarily comprising revenue from casino EGMs and table games played by Australian residents and tourists, as well as international VIPs (premium and rated players from overseas) playing table games (Allen Consulting Group 2009). In this study we disaggregated the casino revenue figures for 1997–1998 and 2010–2011 into EGM, table game, and VIP revenue, based on the

proportions of revenue share attributed by the ABS (Australian Bureau of Statistics 1998) and Australian Casino Association (Australian Casino Association 2011). We based this disaggregation method on the procedure used by the Productivity Commission (1999, 2010).

Australian Population Estimates and Economic Data

The legal gambling age in Australia is 18 years. Mean estimates of the Australian population aged 18 years and over for 1997–1998 and 2010–2011 were extracted from ABS demographic data (Australian Bureau of Statistics 2014a). These adult population estimates were used to convert the national survey participation rates and problem gambling rates into participation numbers. Average participant expenditure estimates were calculated using these participant numbers as denominators and AGS product expenditure figures as numerators.

Disposable income per capita was extracted from ABS National Accounts data (Australian Bureau of Statistics 2013). This was the average amount of money available to each individual Australian for spending and saving after deducting personal income tax and the Medicare levy from gross income.

Expenditure on a selection of essential products (food, health, clothing and footwear, electricity, gas and other fuel sources) and non-essential products (cigarettes and tobacco, alcoholic beverages) were likewise extracted from the ABS National Accounts data for comparison with gambling expenditure.[2]

Average consumer expenditure on each essential product was estimated by dividing the seasonally adjusted total product expenditure figures for each period by the total number of Australians. Average consumer expenditure on each non-essential product was estimated by the dividing seasonally adjusted total product expenditure by the total number of consumers represented by respective participation rates in the National Drug Strategy Household Survey (Australian Institute of Health and Welfare 2014).

All nominal financial values extracted from ABS and AGS data for the 1997–1998 and 2010–2011 periods and converted into equivalent and comparable 2012–2013 dollar values using the Consumer Price Index (CPI) (Australian Bureau of Statistics 2014b). The CPI is a measure of change over time in the price of a constant 'basket' of goods and services that represents a high proportion of expenditure by metropolitan households.

Results

Gambling Participation

Between 1997–98 and 2010–11, the national participation rate declined by 21% for gambling collectively and across individual gambling forms, with the exception of sportsbetting (Table 1 and Gainsbury et al. 2015).

Once population growth was accounted for, the absolute number of gamblers was found to have remained roughly constant at 11 million over the same period, and indeed rose by around 15% for casino games and race wagering (Table 1 and Fig. 1). For the other

[2] See *Australian System of National Accounts: Concepts, Sources and Methods* (Australian Bureau of Statistics, 2015) for further details on these product classifications.

Table 1 National gambling participation rates and corresponding population numbers

	National participation rates			Number of participating adults			
	1997–1998 %[a]	2010–2011 %[b]	Δ %	1997–1998 N[c]	2010–2011 N[c]	ΔN	% Δ in N
Lottery, lotto, or pools tickets	60.89	43.19	−29.07	8,422,229	7,389,343	−1,032,886	−12.26
Instant scratch tickets	45.91	31.49	−31.41	6,350,214	5,387,599	−962,615	−15.16
Racing	24.06	22.42	−6.82	3,327,949	3,835,820	507,871	15.26
EGMs or 'Pokies'	38.57	19.43	−49.62	5,334,954	3,324,263	−2,010,691	−37.69
Sports betting	6.58	13.28	101.82	910,137	2,272,065	1,361,927	149.64
Keno	15.71	8.90	−43.35	2,172,988	1,522,694	−650,294	−29.93
Casino table games	9.34	8.71	−6.75	1,291,897	1,490,187	198,290	15.35
Bingo	4.89	2.94	−39.88	676,379	503,002	−173,376	−25.63
Total gamblers	81.67	64.26	−21.32	11,296,492	10,994,193	−302,300	−2.68
Online	–	8.10	–	–	1,385,823	–	–
Offline	–	56.16	–	–	9,608,370	–	–
Total non-gamblers	18.33	35.74	94.34	2,535,383	6,114,728	3,579,346	141.18
Total Australian adults	–	–	–	13,831,875	17,108,921	3,277,046	23.69

[a] Productivity Commission (1999)

[b] Gainsbury et al. (2015)

[c] Rates transformed into Australian adult population figures

products, the direction of changes in participant numbers were consistent with the direction of participation rates.

Gambling Expenditure

Expenditure patterns between 1997–1998 and 2010–2011 favoured higher–risk gambling products. The riskiest form of gambling (EGMs) grew particularly strongly from 1997–1998 to 2010–2011. Sports betting—now perceived as a risky form of gambling for some demographic groups (Davidson et al. 2016)—rose phenomenally (by round nine-fold). In contrast, expenditure on one of the safest forms of gambling—instant scratch tickets—fell (Table 2).

Expenditure per Gambler

Real per capita spending on gambling fell over the relevant period (Table 3). However, from a public policy perspective, a more important metric is real spending on a given form of gambling by those who gamble on that form since this is related to the risk of harm. The most remarkable feature of the data was the large growth in the expenditure by EGM gamblers. Participants spent an average of $3817 each in 2010–2011 (Fig. 2). This was

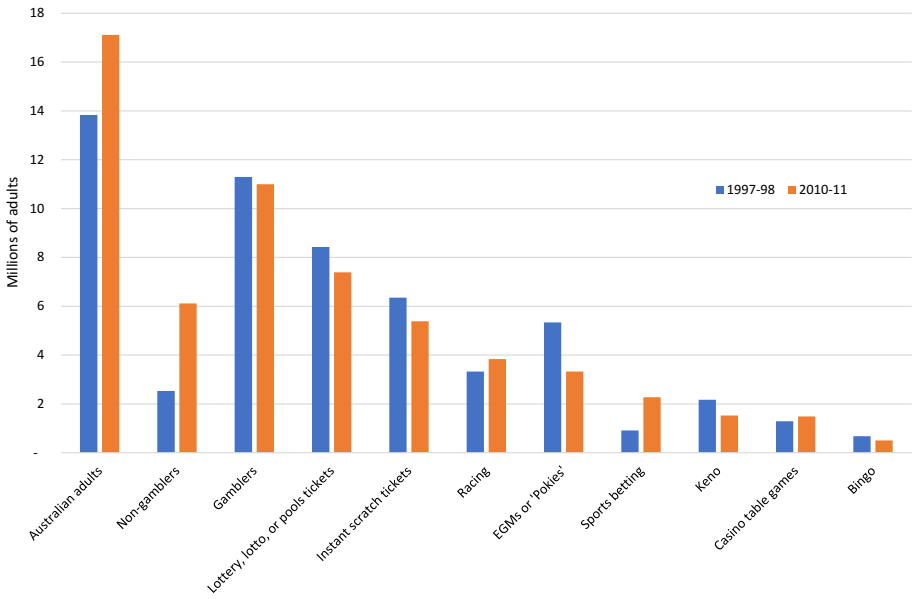

Fig. 1 Number of Australian adults, non-gamblers, and gamblers by product

twice as much as they spent in 1997–1998. When considering all gambling products, real spending per gambler, excluding spending by international VIP casino players, increased 22% to $1779 in 2010–2011.

Expenditure per Gambler as a Share of per Capita Disposable Income

Although expenditure per gambler grew 22% over the relevant period, growth in per capita disposable incomes was even stronger at 37%.[3] Assuming that the average gambler had a disposable income equivalent to the average Australian, this suggested an 11% fall in the share of income they spent on gambling (Table 4).

The large growth in the suggested share of per capita disposable income spent on EGMs by the average participant stood out from this data. This contrasted with the declines observed across the other higher risk products and gambling overall.

Compared to spending on a range of essential and non-essential products, average participant expenditure on higher-risk products was similar to that spent by consumers on food, health, clothing and footwear, electricity and gas, and cigarettes and alcohol (Fig. 3) (Australian Bureau of Statistics 2013; Australian Institute of Health and Welfare 2014).

Gambling Problems

Table 5 shows the Productivity Commission's (2010) estimates of national problem gambling prevalence for 2009 alongside those of Gainsbury et al. (2014) for 2010–2011. Our transformation of the latter rates into population numbers revealed comparable numbers of problem gamblers to the Productivity Commission, but twice as many

[3] Real disposable income per capita rose 37% from $31,941 to $43,903 between 1997-98 and 2010-11 (Australian Bureau of Statistics, 2013).

Table 2 National gambling expenditure

	1997–98		2010–11		Change	
	$ mil	% share	$ mil	% share	Δ $ mil	Δ %
Lottery, lotto, or pools tickets	1509	8.73	1639	8.06	130.71	8.66
Instant scratch tickets	343	1.99	219	1.08	−123.90	−36.09
Racing	2507	14.51	2824	13.89	316.69	12.63
EGMs or 'Pokies'	10,061	58.23	12,687	62.39	2625.81	26.10
Hotels and clubs	8959	51.85	11,124	54.70	2164.26	24.16
Casinos[a]	1102	6.38	1563	7.69	461.54	41.89
Sports betting	38	0.22	337	1.66	299.21	792.12
Keno	261	1.51	299	1.47	37.35	14.30
Casino table games[a]	2254	13.04	2284	11.23	30.54	1.36
Non-VIPs	1409	8.15	1506	7.40	96.74	6.87
International VIPs	845	4.89	778	3.83	−66.20	−7.84
Casino games nec[b]	53	0.30	20	0.10%	−32.21	−61.27
Bingo, raffles, envelopes	253[c]	1.47	26[d]	0.13	–[e]	–[e]
Total	17,279	100	20,336	100	3056.70	17.69
Total excluding international casino VIPs	16,435	95.11	19,557	96.17%	3122.90	19.00

Expenditure figures rounded to nearest whole number and expressed in millions of 2013 AU dollars

[a] Casino EGM and international VIP expenditure estimates based on revenue shares from the Australian Bureau of Statistics (1998) and the Australian Casino Association (2011)

[b] Casino games not elsewhere classified include Keno, sports betting, bingo and other minor gambling activities

[c] QLD, SA, TAS, WA data only

[d] WA data only

[e] Data not comparable between periods

moderate risk gamblers. A further 1.3 million adults were found to be low risk gamblers. In total, 2 million adults representing 19% of those who gambled experienced one or more gambling-related problems.

Discussion

The finding that around 11 million people gambled in both 1997–1998 and 2010–2011 provides an important contrasting view when compared to the declines in participation rates over the same period emphasized in national and state studies (Abbott et al. 2015; Gainsbury et al. 2015; Productivity Commission 2010). These declines have been emphasized in industry submissions to government to illustrate the declining popularity of gambling (Australian Hotels Association, 2009; Australian Leisure and Hospitality Group, 2016b) and interpreted to reflect a reduction in the number of Australians gambling (Gainsbury et al. 2015; Hing et al. 2014). The marked increase in the number of people we found participating in casino table games and race wagering likewise contrasts with the emphasis placed on declining participation rates for these products (Gainsbury et al. 2015; Hing et al. 2014).

Table 3 Gambling expenditure, per capita and per consumer

	Per capita (per adult)				Per consumer of a given gambling form			
	1997–98 $	2010–11 $	Δ $	%Δ$ %	1997–98 $	2010–11 $	Δ $	%Δ$
Lottery, lotto, or pools tickets	109.07	95.82	−13.25	−12.15	179.13	221.85	42.73	23.85
Instant scratch tickets	24.82	12.82	−12.00	−48.33	54.06	40.72	−13.34	−24.67
Racing	181.27	165.06	−16.21	−8.94	753.39	736.20	−17.19	−2.28
EGMs or 'Pokies'[a]	727.40	741.55	14.15	1.95	1885.92	3816.52	1930.60	102.37
Sports betting	2.73	19.70	16.97	621.24	41.50	148.32	106.81	257.36
Keno	18.89	17.45	−1.43	−7.59	120.23	196.11	75.88	63.11
Casino table games excluding international VIPs[a]	101.87	88.01	−13.86	−13.60	1090.64	1010.43	−80.21	−7.35
Bingo, raffles, envelopes	18.33[b]	1.52[c]	–[d]	–[d]	n.a	n.a.	n.a.	n.a.
Average	1249.22	1188.61	−60.62	−4.85	1529.60	1849.69	320.09	20.93
Average excluding international casino VIPs	1188.17	1143.12	−45.05	−3.79	1454.84	1778.89	324.05	22.27

Expenditure figures standardised to 2013 AU dollars

[a] Casino EGM and international VIP expenditure estimates based on revenue shares from the Australian Bureau of Statistics (1998) and the Australian Casino Association (2011)

[b] QLD, SA, TAS, WA data only

[c] WA data only

[d] Data not comparable between periods

For the other products, the directions of changes in participant numbers were consistent with the directions of previously reported rate changes. Sportsbetting participant numbers more than doubled, whereas participation numbers declined for lottery products, keno, instant scratch tickets and bingo. EGMs in particular showed a significant decline of more than one-third in participation numbers.

This pattern of changes appears to highlight a shift in the gambling preferences of Australians away from games that emphasize chance (EGMs, lottery products, keno, instant scratch tickets, bingo) to "skill-based" games which have been marketed to emphasize the value of knowledge and experience in predicting the outcome (sports betting, racing, casino table games) (Browne et al. 2013; Hing et al. 2013; Lamont et al. 2011; McMullan et al. 2012; Monaghan et al. 2008).

These are new and policy-relevant findings since they may also reflect a potential shift in the source of harm for many gamblers away from EGMs which are the highest risk product to the three latter products which previous research has also associated with higher risks (Abbott et al. 2015; Binde 2011; Gainsbury et al. 2014). With two million fewer people gambling on EGMs and two million more gambling on skill-based games, harm minimization regulations and public health interventions from education to treatment need

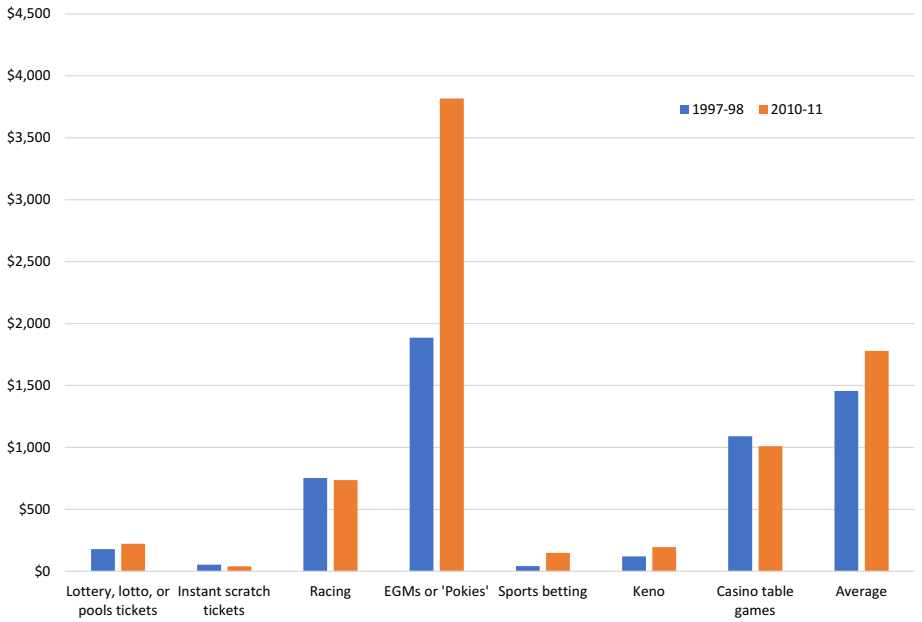

Fig. 2 Average annual participant expenditure per product

to broaden their scope beyond the common focus on EGMs to encompass a wider range of gambling experiences through which people can come to be harmed.

Whereas participant numbers were similar at both time points, we found that the average amount they were spending had grown, overall by twenty two percent to around $1779 per gambler and by varying amounts across half of the products where data were available. These findings provide a new and important counterpoint to the much lower corresponding per capita expenditure figures reported annually in Australian Gambling Statistics, which showed the opposite pattern: a small decline in spending on average to $1183 underpinned by declines across most products over the period. Our findings, drawing on the same industry revenue data, show that those *who* gambled were spending more, not less.

Using the previously established amount of AU$450-500 a year (Currie et al. 2008; Currie et al. 2006; Dowling et al. 2016) or 1.2% of gross personal income (1.6% disposable income) (Dowling et al. 2016)[4] as a safety benchmark, our findings suggest that Australian gamblers may have been spending at levels that put them at elevated risk of harm in both periods, on average, and on all three well established higher risk products—race wagering, casino table games, and particularly EGMs. No other product broached these thresholds.

To put the risky expenditure levels into context, in 2010–2011, average gambling losses were equivalent to an average Australian's spending on health costs, or the combined spending on electricity, gas, clothing and footwear. Average race wagering losses by those who wagered, at around $740, were similar to the average Australian's annual electricity and gas bill. Average casino table game losses of around $1000 mirrored the amount spent by the average consumer on alcohol. Average EGM losses of $3800 were equivalent to the

[4] Australia and Canada are comparable in terms of currency value ($AUD/CAD = .98)(USFOREX 2016).

Table 4 Expenditure per consumer on gambling products and selected essential and non-essential products, in dollars and as a share of disposable income per capita

	Per consumer of a given product			Share of disposable income per capita		
	1997–98 $	2010–11 $	Δ $	1997–98 %	2010–11 %	Δ %
Gambling products						
Lottery, lotto, or pools tickets	179.13	221.85	42.73	0.56	0.51	−9.89
Instant scratch tickets	54.06	40.72	−13.34	0.17	0.09	−45.20
Racing	753.39	736.20	−17.19	2.36	1.68	−28.91
EGMs or 'Pokies'[a]	1885.92	3816.52	1930.60	5.90	8.69	47.23
Sports betting	41.50	148.32	106.81	0.13	0.34	159.99
Keno	120.23	196.11	75.88	0.38	0.45	18.67
Casino table games excluding international VIPs[a]	1090.64	1010.43	−80.21	3.41	2.30	−32.60
Bingo, raffles, envelopes[b]	n.a	n.a.	n.a.	n.a	n.a	n.a.
Average spent on gambling	1529.60	1849.69	320.09	4.79	4.21	−12.02
Average spent on gambling, excluding international casino VIPs	1454.84	1778.89	324.05	4.55	4.05	−11.04
Other non-essential products[c]						
Cigarettes and tobacco products	2953.83	4301.23	1347.40	9.25	9.80	5.94
Alcoholic beverages	833.90	1035.37	201.46	2.61	2.36	−9.67
Essential products[d]						
Food	3005.93	3647.30	641.37	9.41	8.31	−11.72
Health	1300.47	2071.85	771.38	4.07	4.72	15.91
Clothing and footwear	1135.38	1180.32	44.94	3.55	2.69	−24.37
Electricity, gas, and other fuel	544.02	816.91	272.89	1.70	1.86	9.25

Expenditure figures standardised to 2013 AU dollars; Real disposable income per capita rose 37% between 1997–1998 and 2010–2011 from $31,941 to $43,903 (Australian Bureau of Statistics, 2013)

[a] Casino EGM and international VIP expenditure estimates based on revenue shares reported by the Australian Bureau of Statistics (1998) and the Australian Casino Association (2011)

[b] Data not comparable between periods

[c] Tobacco and alcohol consumer expenditure estimates were derived by dividing the seasonally adjusted total product expenditure figures reported in Australian National Accounts (Australian Bureau of Statistics 2013) by the total number of consumers represented by respective participation rates in the National Drug Strategy Household Survey (Australian Institute of Health and Welfare, 2014)

[d] Consumer expenditure on each essential product was derived by dividing the seasonally adjusted total product expenditure figures reported in Australian National Accounts (2013) by the total number of Australians

average Australian's annual food bill, and approached the average amount consumers spent on tobacco.

These findings stand in particularly stark contrast to those of the Australian Bureau of Statistics' Household Expenditure Survey (HES) in which self-reported annual household gambling expenditure diminished by 28% from $455 to $329 over the same period (Australian Bureau of Statistics 2000, 2010). Industry groups continue to present these HES data in submissions to government to influence regulatory reform. They describe a

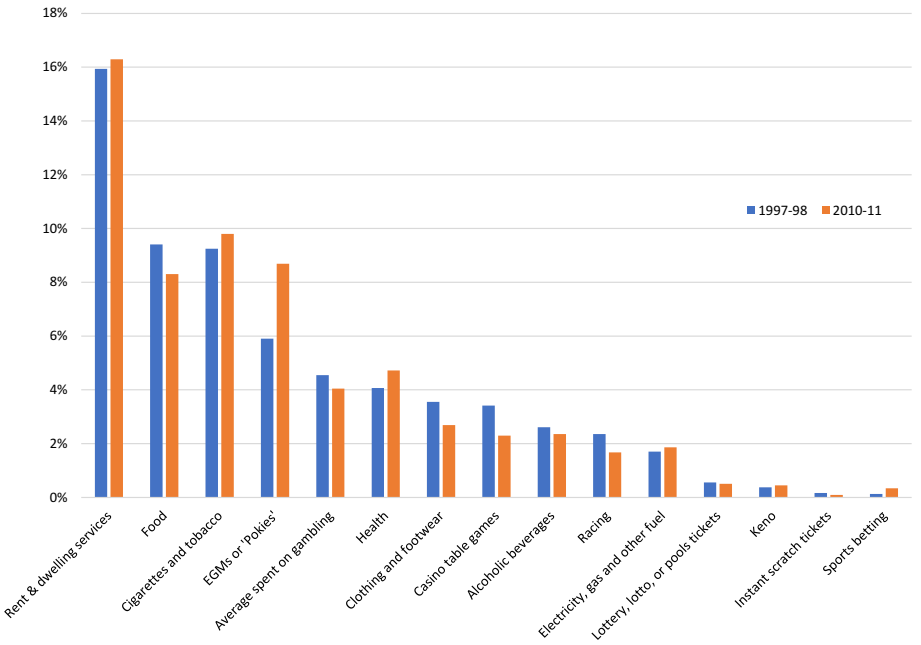

Fig. 3 Expenditure per consumer on essential and non-essential products including gambling as a share of disposable income per capita

Table 5 Gambling problem prevalence estimates and corresponding population numbers

	June 2009			2010–2011		
	Adult population %[a]	Adult gamblers %	Adults N[a]	Adult population %[b]	Adult gamblers %[b]	Adults N[c]
Non-gambler	–	–	–	35.74	NA	6,114,728
Non problem gambler	–	–	–	52.30	81.39	8,947,966
Low risk gambler (PGSI 1-2)	–	–	–	7.65	11.90	1,308,832
Moderate risk gambler (PGSI 3-7)	0.69	–	297,000	3.70	5.76	633,030
Problem gambler (PGSI 8 +)	1.67	–	116,000	0.61	0.95	104,364
Any risk gambler (PGSI 1 +)	–	–	–	11.96	18.61	2,046,227
High risk gambler (PGSI 3 +)	2.36	–	395,000	4.31	6.71	737,394

[a] The Productivity Commission (2010) estimated prevalence figures for moderate risk and problem gamblers only

[b] Gainsbury et al. (2014)

[c] Rates transformed into Australian adult population figures

small and diminishing proportion of household expenditure dedicated to gambling relative to other goods and services (Australian Hotels Association, 2009; Australian Leisure and Hospitality Group, 2016b). Our findings illustrate what others have found, in that the HES provides an invalid estimate of consumer gambling expenditure (Productivity Commission 2010). Gambling expenditure constitutes a portion of the average consumer's income comparable to that spent on both essential products and legally sanctioned products associated with addiction.

While this is so, our findings did suggest that the proportion of participants' disposable income dedicated to gambling declined, by around 11% on average, and around 30% for racing and casino table games between 1997–1998 and 2010–2011. This is because the average disposable income grew substantially over the period, much more so than growth in average consumption expenditure on goods and services including that spent on gambling. This suggests that although expenditure levels broached potential risk thresholds in both periods, there may have been a reduction in risk, for the average gambler and participants on these two products.

No suggestion of diminished risk was indicated for EGMs, where the proportion of personal disposable income spent by participants was found to have risen to around nine percent since the Commission's first inquiry. This finding poses a counterpoint to the emphasis on the declines in national disposable income spent on EGMs referred to by industry groups to illustrate concerns for the sustainability and future of the industry under current regulations (Australian Hotels Association, 2009; Australian Leisure and Hospitality Group, 2009). From an industry perspective, the decline reflects a clear loss of national income share to other goods and services over the period. However, from a public health perspective, our figures suggest that existing revenue levels are sustained by increasingly harmful levels of spending.

Our expenditure findings will be a cause of concern for policy makers, community and industry groups. There has been an expectation that the proliferation of regulations and initiatives surrounding higher risk gambling products since the late 1990s would lead to a reduction in risk of harm amongst gamblers over time (Delfabbro et al. 2016, 2017). However, it would appear that in both periods examined, industry revenue levels for casino table gaming, racing and particularly EGMs, were dependent on harmful levels of average participant expenditure. And while the risks appear to have reduced for racing and casino table games, the risks appear to have increased for EGMs. These findings emphasize the importance of evaluating and improving current harm minimization regulations and programs for these products.

With respect to the rise and risks of sportsbetting, various recent studies have moderately associated participation with gambling problems behind established risky products (Binde 2011; Hing et al. 2014) and some service providers have reported an upswing in the number of clients with sportsbetting-related problems (Hunt 2013; Statistics New Zealand 2015; Victorian Responsible Gambling Foundation 2013). Yet in our study the average annual spend of around $150 remained lower than for all other activities except instant scratch tickets. This is clearly not a risky amount to spend, though average expenditure does not reveal the share of gamblers who spend a large amount and those who spend little. It looks likely that those who spent problematically may represent a small and concentrated segment of participants, as suggested by a recent state survey (Davidson et al. 2016). The upsurge in help-seeking clients may be reflective of the large rise in participant numbers rather than a rise in the proportion of participants experiencing problems—an area requiring further research.

Finally, our efforts to provide a more accurate population-representative estimate of the number of Australians who experienced gambling problems revealed much larger numbers than the Productivity Commission (2010) had estimated using state-based data. Although we found similar numbers of problem gamblers, we found that over 600,000 people experienced moderate gambling problems. This was twice the number estimated by the Commission which continues to be used to describe the number of Australians at risk of becoming problem gamblers and to make policy decisions (e.g. (Australian Government, 2015).

Recognition of the potential size of this group as well as the previously unrecognized 1.4 million Australians we estimated to have experienced low-level gambling problems is important. In a recent state-based study in which similar gambling problem rates were identified, low-risk gamblers were found to account for half of the aggregate harm caused by gambling due to their numerosity, with a further third accounted for by moderate-risk gamblers. Only fifteen percent of harm in the state was attributable to problem gamblers. The combination of relational damage, psychological distress, health and financial impacts resulting from gambling problems was found to cause harm of a similar magnitude to major depressive disorder or alcohol misuse and dependence (Browne et al. 2016).

Together these findings suggest a revision of the current focus of gambling-related public health policy and resourcing. Attention is disproportionately concentrated on preventing people from becoming problem gamblers or treating the relatively small number of people who are problem gamblers (Australian Government, 2015; The Liberal Party and the National Party of Australia 2013). Our findings point to the greater importance of containing the adverse consequences experienced by the vast majority of those harmed by their involvement who have low to moderate level gambling problems.

Methodological Issues and Future Research

Our findings have global relevance for gambling studies where participation rates or problem gambling rates are compared over time, and especially where government priorities and resourcing decisions are based on this research. In the context of a growing population, equal participation rates at two time intervals amounts to an increase in participation numbers, and even a decline in rates may be masking an increase in numbers given large enough growth in the population. This is the case in the USA, Sweden and New Zealand. While national participation rates have declined and problem gambling rates have remained stable over the past decade (Abbott et al. 2014a, b; Welte et al. 2015), population growth over the same period would indicate that there are more people gambling or problem gambling than ever before in all three countries (Statistics New Zealand 2015; Statistics Sweden 2015; U.S. Census Bureau 2001, 2015). These increases in numbers would be highly relevant to elected officials, policy makers, regulators, public service providers and community stakeholders. However, these increases have received little to no consideration in associated reports, publications or reviews.

Several other issues merit caution and further investigation. The standard errors and confidence intervals associated with the participation and problem rates we used were not published in the originating peer-reviewed articles or reports. They were therefore not used here to show the potential variation in related population numbers or expenditure figures at either time point. Our statistics should therefore be treated as indicative estimates rather than exact figures.

The time points of 1997–1998 and 2010–2011 were examined because these are the only two points at which there have been comparable national gambling surveys in

Australia. More recent prevalence data is needed to describe current trends. A further survey would also be valuable to validate the large numbers of sports betting participants, as well as low and moderate risk gamblers implicated by the second national survey. A much smaller recent national survey reported much lower prevalence rates in all three cases (Dowling et al. 2016). On the other hand, recent state prevalence surveys in the Northern Territory (Stevens et al. 2017), Victoria (Abbott et al. 2015) South Australia (The Social Research Centre 2013), and New South Wales (Sproston et al. 2012) reported much lower sports betting participation rates (5–8%), somewhat smaller moderate risk rates (2–3%), and comparable low-risk rates (8–9%).

While we have reported average participant expenditure estimates, more detailed research is needed to appropriately apportion spending shares to people with different levels of gambling problems across the product range. The Productivity Commission in 1999 estimated that the 290,000 moderate risk and problem gamblers accounted for an estimated 33% of the money spent on gambling in 1997–1998. Other estimates produced at the state level and in other countries have ranged between 19 and 37% (Davidson et al. 2016; Treymane et al. 2001; Williams and Wood 2004; Young et al. 2006). Estimates relating to EGM expenditure are even higher, with 60% attributed to moderate risk and problem gamblers (Productivity Commission 2010). The high expenditure share of those with gambling problems, who are frequently also from low socioeconomic groups (Rintoul et al. 2013; Shaffer 2004), skews estimations on what might be considered the average and indeed "normal"' amounts spent on gambling. Participant data at this level would assist efforts to determine the extent and bounds of risky gambling expenditure.

Summary and Conclusions

If one drew solely on the declining participation rates, problem gambling rates, per capita expenditure, annual household expenditure, and national disposable income spent on gambling, one might be drawn to conclude, that in Australia, there were fewer people gambling, that they were spending less, and that there were fewer people at risk of harm, in 2010–2011 than in 1997–1998. It might appear that government intervention and industry and consumer self-regulation had led to an overall improvement in gambling safety since the problems of the 1990s.

But these statistics do not accurately reflect gambling activity amongst those who participate, as they include a large proportion of non-gamblers in their calculation. As we have shown, accounting for this factor is essential in describing gambling activity amongst those who gamble and those who regulation is meant to keep safe.

Our findings suggest that the number of Australians gambling remained the same rather than declined, balanced by shift in participation from products that emphasize chance towards those that emphasize skill in predicting the outcome including sports betting, race wagering and casino gaming. This in turn suggests a shift in the source and experience of gambling problems and therefore a need to broaden the focus of public health interventions to include these products.

We further found concerning levels of average participant expenditure in both periods on race wagering, casino gaming and EGMs. A decline in the proportion of income spent on race wagering and casinos suggested that the risks, while still high, may have lessened somewhat. A large increase in income spent on EGMs suggested the opposite. Our findings

would suggest that despite more than a decade of scrutiny and regulation the majority of gambling revenue continued to be derived from risky levels of participant spending.

In line with this, two million Australians appeared to have experienced one or more gambling problems in 2010–2011, with only one hundred thousand people in the highest risk problem gambling category. This strongly suggests a need to develop a broader public health focus on preventing gambling problems rather than continue to focus most resources toward identifying and treating the highest risk group.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Human and Animals Rights This article does not contain any studies with human participants performed by any of the authors.

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