

The Extent and Distribution of Gambling-Related Harms and the Prevention Paradox in a British Population Survey

NATALE CANALE^{1*}, ALESSIO VIENO¹ and MARK D. GRIFFITHS²

¹Department of Developmental and Social Psychology, University of Padova, Italy

²International Gaming Research Unit, Psychology Division, Nottingham Trent University, United Kingdom

(Received: October 14, 2015; accepted: March 7, 2016)

Objectives: To examine whether the “prevention paradox” applies to British individuals in relation to gambling-related harm. *Methods:* Data were derived from 7,756 individuals participating in the British Gambling Prevalence Survey 2010, a comprehensive interview-based survey conducted in Great Britain between November 2009 and May 2010. Gambling-related harm was assessed using an adapted version of the DSM-IV Pathological Gambling criteria. The previous year’s prevalence of problem gamblers was examined using the Problem Gambling Severity Index. Gambling involvement was measured by gambling frequency and gambling participation (gambling volume as expressed by time and money spent gambling). *Results:* The prevalence rates for past-year gambling harms were dependence harm (16.4%), social harm (2.2%), and chasing losses (7.9%). Gambling-related harms were distributed across low- to moderate-risk gamblers (and not limited to just problem gamblers) and were reported by the majority of gamblers who were non-high time and spend regular gamblers than high time and spend regular gamblers. *Conclusions:* The prevention paradox is a promising way of examining gambling-related harm. This suggests that prevention of gambling might need to consider the population approach to minimizing gambling harm.

Keywords: gambling, Great Britain, gambling involvement, population studies, prevention paradox, harms

INTRODUCTION

Gambling growth over the past 20 years has placed gambling-related harms at the foreground of public health concerns for adults (Raisamo, Mäkelä, Salonen, & Lintonen, 2014) and youth (Molinaro et al., 2014). Although gambling is a socially acceptable behavior (Griffiths, 1996), epidemiological research estimates that 0.2%–2.3% of adults in the general population meet the criteria for problem or pathological gambling (Gainsbury et al., 2014). Gambling disorder has now been officially classed by the American Psychiatric Association (APA) as a behavioral addiction characterized by “persistent and recurrent maladaptive gambling behavior that disrupts personal, family, and/or vocational pursuits” (p. 586; American Psychiatric Association, 2013). Gambling disorder has been associated with significant health and psychosocial problems (Abbott et al., 2013; Meyer, Hayer, & Griffiths, 2009) as well as increased comorbidities with substance abuse disorder, anxiety, and mood disorder (Lorains, Cowlishaw, & Thomas, 2011). Although much research has focused on problem and pathological gambling (Milosevic & Ledgerwood, 2010; Nower, Martins, Lin, & Blanco, 2013), less is known about the distribution of gambling-related harm among non-problem gamblers in general populations (Meyer et al., 2009). Previous papers (Blaszczynski, 2009; Rodgers, Caldwell, & Butterworth, 2009) have noted this, suggesting a shift of focus in gambling research from the measurement of discrete cases of pathological gambling to the broader challenge of evaluating exposure and harm associated with all levels of participation (not just problem gambling).

Recently, several forms of gambling severity (e.g., problem gambling, compulsive gambling, irresponsible gambling, gambling disorder, or pathological gambling) as well as frequency of gambling have also been referred to as “harmful gambling” (Abbott et al., 2013). Abbott et al. (2013) presented a comprehensive conceptual framework of harmful gambling that suggested a harm-based view in order to enable analysis of gambling impact. In this study, an adapted version of the DSM-IV pathological gambling criteria (American Psychiatric Association, 2000; Sproston, Erens, & Orford, 2000) was used to assess gambling harm. The term “gambling harm” is used throughout this manuscript to indicate all of the 10 items included in the adapted version of the DSM-IV pathological gambling criteria (American Psychiatric Association, 2000; Sproston et al., 2000).

In the prevention field, two different (but not mutually exclusive) approaches can be considered: high-risk strategy and population strategy (Galani & Schneider, 2007; Gmel, Klingemann, Müller, & Brenner 2001; Skog, 2006). High-risk strategies aim to reduce problems and consumption via targeted interventions in small groups of individuals, who are considered at high-risk. Alternatively, population strategies aim to decrease general consumption and overall problems via interventions focused on general populations. Consequently, population-approaches shift the population distribution of consumption and problems in a lower

* Corresponding author: Natale Canale, MSc; Department of Developmental and Social Psychology, University of Padova, Via Venezia, 15-35121 Padova, Italy; E-mail: natalecanale4@gmail.com

direction. For instance, most alcohol-related problems appear to occur in low to moderate drinkers, rather than heavy drinkers (Rossow & Romelsjö, 2006). This is known as the “prevention paradox” (PP) (Rose, 1981). Although heavy drinkers have a higher individual risk of adverse outcomes, low-risk drinkers account for most problems simply because of greater number of individuals within this group (Rose, 1981). The PP is also relevant for gambling because gambling can be conceptualized along a continuum, ranging from no gambling to occasional gambling to “at-risk” gambling, to problem gambling. Additionally, gambling harms can be considered along a severity continuum ranging from no harm through mild, substantial, to severe harm (Korn, Gibbins, & Azmier, 2003; Marshall, 2009). Thus, it seems necessary to consider harms experienced at any level of gambling involvement, not only among individuals considered problem gamblers.

A previous Finnish population study reported most gambling-related harms were among the majority of low-risk gamblers, even though the individual risk of harm was highest among problem gamblers (Raisamo et al., 2014). This study was the first to lend support to the PP among gamblers. Consequently, the present study investigates whether the PP applies to gambling-related harm in another country (i.e., Great Britain) by examining distribution of gambling-related harm by the level of gambling severity and volume. Great Britain has one of the most diverse and accessible commercial gambling markets in the world. Since the introduction of the National Lottery in 1994 and the introduction of the 2005 Gambling Act, the country has markedly deregulated and liberalized gambling opportunities (Wardle, 2015). In gambling (and problem gambling), it is important to adopt a broader perspective focusing on the role of other contextual factors including situational and structural characteristics (Griffiths & Delfabbro, 2001; Molinaro et al., 2014; Reith, 2012). Previous Canadian (Currie et al., 2006; Currie, Miller, Hodgins, & Wang, 2009) and Finnish (Raisamo et al., 2014) studies indicate that the odds of at least two gambling-related harms increase steadily with greater gambling frequency and expenditure.

This study’s analyses expand upon the previous Finnish PP study. First, the volume of gambling grouping (i.e., time/expenditure) has a finer level of precision than the previous study (limited in its ability to discriminate degrees of risk due to use of the Problem Gambling Severity Index [PGSI]). As Blaszczynski, Ladouceur, Goulet, and Savard (2008) argued, all gambling-related harms derive from individuals exceeding levels of discretionary disposable income and leisure time; thus, it is important to have a clear understanding toward the extent of harm consequent to participation in gambling, irrespective of pathological gambling “caseness” (i.e., those meeting diagnostic criteria). Second, the PP is applied to three different types of gambling-related harm: dependence harm, social harm, and possible dependence (i.e., “chasing losses”). Although the Finnish study focused largely on all gambling harms, this study, in accordance with previous works on PP and alcohol (e.g., Caetano, Mills, Pinsky, Zaleski, & Laranjeira, 2012), examined the applicability of the PP to specific dependence, possible dependence, and social harm in the British population. For example, Caetano, Mills, Pinsky, Zaleski, and Laranjeira

(2012) found evidence of the PP for social- and dependence-related problems. More specifically, belligerence, police problems, accidents, health-related problems, problems with spouse, problems with other people, work-related problems, and financial problems were considered as social problems, whereas salience of drinking, needing to drink, increased tolerance, impaired control, withdrawal symptoms, and prolonged intoxication were considered as alcohol dependence-related problems. No previous studies have ever examined the applicability of the PP to three types of gambling harm in a general population.

METHODS

Sample and data collection

Data were extracted from the 2010 British Gambling Prevalence Survey (BGPS) dataset that were collected by the National Centre for Social Research (NatCen). The sample was drawn at random from the Postcode Address File and stratified according to age, occupational status, and ethnic group. In total, 9,775 addresses were selected. Between November 2009 and May 2010, a computer-assisted self-interview was used to interview individuals aged 16 years and older from the British household population (for additional sampling design details, see Wardle et al., 2011b). The response rate was 47%, and the final dataset comprised 7,756 individuals. To ensure British population representativeness, data were weighted based on age, gender, and region. Table 1 summarizes characteristics of the study sample that contained slightly more women than men. This reflects Office of National Statistics (ONS) mid-2009 population estimates data, which show a slightly greater proportion of women than men (51% and 49%). In age distribution, women were more likely to be aged 75 years and over (10.2%; 7.5% men), also reflecting the ONS population estimates data.

Measures

Gambling-related harm in the previous year. Gambling harm was assessed using an adapted version of the DSM-IV pathological gambling criteria (American Psychiatric Association, 2000; Sproston et al., 2000) recorded in the 2010 BGPS (Wardle et al., 2011b). Ten gambling-related harms were assessed. One of the symptoms in the DSM-IV diagnostic criteria is chasing losses [i.e., betting more money after losses in an attempt to “win back” the money lost (American Psychiatric Association, 2013)]. This often reflects an underlying gambling preoccupation accompanied by a misunderstanding of gambling outcomes and irrational beliefs about the likelihood of winning (Griffiths & Whitty, 2010; Svetieva & Walker, 2008). However, while chasing losses is often found among problem gamblers, it is also known to occur within-session among non-problem gamblers (Toce-Gerstein, Gerstein, & Volberg, 2003; Wardle, Moody, Griffiths, Orford, & Volberg, 2011a). Therefore, in this study, chasing losses was categorized as a possible dependence harm. Elsewhere, five of the ten DSM-IV items

Table 1. Frequency counts (and percentage) of participants' characteristics by gender

Sample characteristics	Total <i>n</i> = 7756 (100) ^a	Males <i>n</i> = 3798 (49.0) ^a	Females <i>n</i> = 3958 (51.0) ^a	Chi-square test ^b
Age (mean)	46.43	45.58	47.25	—
Age group (<i>n</i> [%])				10.3; $\Phi = .04$
16–34	2401 (31.0)	1224 (32.2) ^a	1177 (29.7) ^b	
35–54	2709 (34.9)	1341 (35.3) ^a	1368 (34.6) ^a	
55+	2645 (34.1)	1232 (32.4) ^a	1413 (35.7) ^b	
12-month gambling (<i>n</i> [%])				53.1; $\Phi = .08$
Did not gamble in the last 12 months (non-gamblers)	2086 (26.9)	931 (24.5) ^a	1155 (29.2) ^b	
Gambled less than once a month (non-regular gamblers)	1508 (19.5)	669 (17.6) ^a	839 (21.2) ^b	
Gambled monthly or more (regular gamblers)	4152 (53.6)	2193 (57.8) ^a	1959 (49.6) ^b	
Volume grouping of regular gamblers (<i>n</i> [%])				94.0; $\Phi = .15$
Non-high time and spend (regular gamblers)	3539 (85.3)	1768 (80.7) ^a	1771 (90.4) ^b	
High time only, High spend only (regular gamblers)	354 (8.5)	221 (10.1) ^a	133 (6.8) ^b	
High time and spend (regular gamblers)	258 (6.2)	203 (9.3) ^a	55 (2.8) ^b	
PGSI ^c score (<i>n</i> [%])				151.0; $\Phi = .14$
Non-problem gamblers/non-gamblers	7122 (91.9)	3342 (88.2) ^a	3780 (95.6) ^b	
Low-risk gamblers	429 (5.5)	294 (7.8) ^a	135 (3.4) ^b	
Moderate-risk gamblers	138 (1.8)	107 (2.8) ^a	31 (0.8) ^b	
Problem gamblers	57 (0.7)	48 (1.3) ^a	9 (0.2) ^b	

Note. Groups with different superscripts differ significantly from one another in post hoc tests.

^aWeighted %; Unweighted *n*. ^bBold figures indicate statistical significance at *p* level <.001. ^cProblem Gambling Severity Index (Ferris & Wynne, 2001).

relate to difficulties in controlling gambling (i.e., salience, increased tolerance, impaired control, withdrawal symptoms, mood modification) and, in this study, were categorized as dependence harms. The other four DSM-IV items include illegal acts, problems with spouse and/or other people, work-related problems, and financial problems. In this study, these are considered social harms. Participants were asked on a four-point scale (never/occasionally/fairly often/very often) whether they had experienced any specific type of problem due to gambling over the past year. To facilitate analysis and in order to provide more cases: (a) one item (chasing losses) was considered as a possible dependence harm; (b) four items were considered social harms; and (c) five items were considered dependence harms. Both sets of problems had a unifactor structure with acceptable reliability [social: $\alpha = 0.74$, 95% confidence interval (CI) = .73–.75; dependence: $\alpha = .75$; 95% CI = .74–.76]. Considering previous studies on the gambling-related harms (Currie et al., 2006; Raisamo et al., 2014), these summed scales were dichotomized. More specifically, responses were recoded to indicate either the presence (Yes = occasionally/fairly often/very often) or absence of harm (No = never). This definition (at least one type of problem/harm) is similar to that used by Caetano et al. (2012). A single harm may be considered as a liberal definition according to many experts. However, this lower threshold was used because several non-clinical studies of gambling pathology have also used a similar threshold of a single symptom (e.g., Brosowski et al., 2015; Slutske et al., 2001; Slutske, Jackson, & Sher, 2003). Petry, Blanco, Jin, and Grant (2014) found that lowering the threshold (with three criteria, two criteria, and one criterion) resulted in even greater increases in the proportions of respondents classified with a gambling disorder. Indeed, past-year diagnosis increased to 0.60% (SE = .05%) with three criteria as the

threshold, and to 1.22% (SE = .08%) with two criteria, and 2.95% (SE = .13%) with one criterion. Furthermore, Slutske et al. (2000, 2001) showed that the correlations between the same low-threshold definition of problem gambling and antisocial personality disorder ($r = .35$) and alcohol dependence ($r = .30$) were almost the same as the correlations with DSM-III-R pathological gambling disorder (Slutske et al., 2000, 2001). Consequently, these findings provide some justification for the more liberal definition (one or more gambling-related harms) that was used in the present study.

Gambling frequency. The survey included 16 gambling activities. Participants were asked whether they had participated in any during the past year. Participants reporting no gambling during the past year are referred to as “non-gamblers.” Participants were further asked to indicate frequency of involvement (2+ days a week/once a week/once a month, less than once a week/less than once a month). To take into account the total sample (including non-gamblers), a variable was created describing the gambling frequency within three categories: (a) did not gamble in the past year (non-gamblers); (b) gambled less than once a month (non-regular gamblers); and (c) gambled monthly or more (regular gamblers).

Gamblers' classification. According to a previous PP assessment of gambling harms (Raisamo et al., 2014), gamblers are composed of four groups using the PGSI. The previous year's prevalence of problem gamblers was examined for the total sample using the PGSI (Ferris & Wynne, 2001), a nine-item self-report instrument comprising items responded to on a four-point scale: (0 = never/1 = sometimes/2 = most of the time/3 = almost always). Total scores (range 0–27) were calculated ($\alpha = .90$; 95% CI = .89–.91) with four categories identified: non-problem gambler (PGSI score = 0), low-risk gambler (PGSI score = 1–4), moderate-risk gambler (PGSI score = 5–7), and problem gambler (PGSI > 7). Second, expanding on the previous

PP assessment in gambling harms (Raisamo et al., 2014), gamblers comprised four groups according to gambling volume. According to Wood and Williams (2007), measures of time and expenditure were included to serve as a proxy for gambling volume among regular gamblers. For each gambling activity undertaken, regular gamblers reported on how much money they usually spent monthly on a gambling activity (from “£1-£10 per month” to “£501 or more per month”). In addition, regular gamblers reported how much time they usually spent gambling in a typical day (from “<30 min/day” to “8 hr or more per day”). Taking information from both measures together provided four sub-groups of regular gamblers: “high time” regular gamblers (top 10% of regular gamblers who typically spent 7 hr+ a month gambling [mean 31.0 hr/month gambling]); “non-high time” regular gamblers (the other 90% of regular gamblers, who either did not spend any time gambling or generally spent 7 hr/month gambling [mean 30 min/month]); “high spend” regular gamblers (top 10% of regular gamblers, who spent an estimated £61.50+ per-month on gambling [mean expenditure £209.92/month]); and “non-high spend” regular gamblers (the remaining 90% of regular gamblers who spent less than this amount [mean expenditure £14.82/month]). A newly constructed variable investigated the combined effect of gambling time–gambling expenditure on self-reported problems. The following categories were created: (a) non-high time and spend regular gamblers; (b) high time only regular gamblers and high spend only regular gamblers; and (c) high time and spend regular gamblers.

Demographic variables. Individuals reported age and gender. Participants’ gender was coded “1” for females and “2” for males. Age was grouped into three banded categories: 16–34 years/35–54 years/55+ years.

Statistical analyses

Analyses were conducted on data weighted to correct for unequal probabilities of selection into the sample, and a post-stratification weight was applied to correct for non-response within participating households and adjust the sample to known population distributions on demographic variables (education, age, gender, and Government Office Region) matching the ONS 2009 mid-year population estimates. First, bivariate analyses were conducted to describe sample characteristics as well as the prevalence of gambling-related harms (overall and by age and gender) on the entire sample (not just the gamblers). Association between variables was tested using Pearson’s chi-square test. Due to the large sample size, α of 0.001 was used and effect sizes are reported for all chi-square analyses. For chi-square, the phi (Φ) coefficient was used, where values between -0.3 and 0.3 are treated as trivial associations. Second, to examine whether the PP applies to the harms, the distribution of harms among different segments of problem gambling severity continuum and gambling volume among regular gamblers was calculated. Finally, the relationships among chasing losses (whether participants had experienced this in the previous year) and dependence/social harms (whether participants had experienced one or more gambling-related harms in the previous year) and the explanatory variables

(e.g., age, gender, volume grouping) were further examined in logistic regression analyses. CIs were computed at the 95% level and explained variance was evaluated using Nagelkerke R^2 , a pseudo- R^2 .

Ethics

Ethical principles were carried out in accordance with the Declaration of Helsinki. Ethical approval for the survey was given by NatCen’s independent ethics review panel. All participants provided informed consent before participating in the study procedures.

RESULTS

Sample characteristics

Table 1 reports the gender characteristics of the sample. The majority (73%) had participated in gambling within the past year (75% of males and 71% of females). Males gambled significantly more frequently and spent larger amounts of money and time on gambling than females. The overall problem gambling prevalence rate for males and females was 0.7% (PGSI > 7) and 0.9% (DSM-IV > 3). Concerning the overlap between the problem gambling severity continuum and gambling volume among regular gamblers in the sample, two-thirds of problem gamblers (64.6%) were also high time and spend regular gamblers.

Prevalence of DSM-IV gambling-related harms

Table 2 shows the prevalence of reported gambling-related harms (overall and by gender and age). The prevalence

Table 2. Frequency counts and prevalence (%) of self-reported gambling-related harms by gender and age

	One or more gambling-related harms		Possible dependence (chasing losses)
	Dependence harms ^a	Social harms ^b	
All, <i>n</i> (%) ^c	1274 (16.4)	171 (2.2)	610 (7.9)
Gender			
Male	862 (22.7)	134 (3.5)	390 (10.3)
Female	412 (10.4)	37 (0.9)	220 (5.6)
Statistics ^d	212.6; $\Phi = .16$	60.6; $\Phi = .09$	59.0; $\Phi = .08$
Age group			
16–34	597 (24.9)	102 (4.3)	332 (13.9)
35–54	455 (16.8)	54 (2.0)	197 (7.3)
55+	222 (8.4)	16 (0.6)	81 (3.1)
Statistics ^d	257.7; $\Phi = .18$	78.91; $\Phi = .10$	203.5; $\Phi = .16$

^aFive of the ten DSM-IV items relate to difficulties in controlling gambling (salience, increased tolerance, impaired control, withdrawal symptoms, mood modification) and, in this study, were categorized as dependence harms. ^bThe other four DSM-IV items (illegal acts, problems with spouse and/or other people, work-related problems, and financial problems) are considered social harms. ^cWeighted %; unweighted *n*. ^dBold figures indicate statistical significance at *p* level <.001.

Table 3. Distribution of self-reported gambling-related harms by different segment of the Gambling Severity Index

PGSI score	One or more gambling-related harms (n [%]) ^a		Possible dependence (chasing losses)
	Dependence harms ^b	Social harms ^c	
Low-risk gambler (n = 430)	295 (62.1)	35 (25.5)	185 (56.2)
Moderate-risk gambler (n = 138)	125 (26.3)	52 (38.0)	98 (29.8)
Problem gambler (n = 57)	55 (11.6)	50 (36.5)	46 (14.0)
Total	475 (100.0)	137 (100.0)	329 (100.0)

^aWeighted %; unweighted n. ^bFive of the ten DSM-IV items relate to difficulties in controlling gambling (salience, increased tolerance, impaired control, withdrawal symptoms, mood modification) and, in this study, were categorized as dependence harms. ^cThe other four DSM-IV items (illegal acts, problems with spouse and/or other people, work-related problems, and financial problems) are considered social harms.

rates for past-year gambling harms were: (a) dependence harms (16.4%); (b) social harms (2.2%); and (c) chasing losses (7.9%). The prevalence of harm was higher in males than females and in younger age groups (16–34 years) than older age groups (35–54 years and 55+ years). Overall, 17.9% of participants (n = 1387) experienced at least one type of gambling-related harms in the previous year (24% of males, 13.0% of females, $\chi^2_{(1)} = 147.8$, $p < 0.001$, $\Phi = .14$).

Table 3 reports the distribution of gambling harm for different segments of the problem gambling continuum. The results showed that the gambling-related harms distributed across low- to moderate-risk gamblers and were not limited to problem gamblers only. More specifically, results indicated that most low-risk gambler exhibited at least one dependence harm (62%) and a possible dependence harm (i.e., chasing losses, 56%). Regarding social harm, the distribution of self-reported social harms was relatively homogeneous in terms of gamblers' categories, although contribution of the two moderate-risk/problem groups was slightly higher (e.g., 38% for moderate-risk gamblers; 36% for problem gamblers; and 25% for low-risk gamblers).

For gambling volume, most gambling-related harms were reported by the majority of gamblers, who were non-high time and spend regular gamblers compared to high time and spend regular gamblers (see Table 4). For example, of all participants reporting a dependence harm and possible dependence harm, more than half (65%–58%, respectively) were non-high time and spend gamblers compared to high time and spend regular gamblers.

Associations of gambling-related harm with demographic factors and gambling involvement patterns

Table 5 shows the results of multiple logistic regressions. Males were significantly more likely than females to experience the dependence harms (odds ratio [OR] = 1.93; 95% CI = 1.65–2.27) and social harms (OR = 1.90; 95% CI = 1.28–2.83), while those in younger age groups (16–34 years old) were significantly more likely than those in older age groups (35–54 years and 55+ years) to experience dependence harms (OR = 4.69; 95% CI = 3.82–5.75), social harms (OR = 7.27; 95% CI = 4.11–12.88) and possible dependence (OR = 6.46; 95% CI = 4.87–8.57). The odds of reporting harm increased substantially with greater gambling volume. More specifically, a high volume of gambling (time and spend) was strongly associated with dependence harm (OR = 9.72; 95% CI = 7.16–13.18), social harm (OR = 10.63; 95% CI = 7.09–15.92) and possible dependence (OR = 8.41; 95% CI = 6.28–11.26).

DISCUSSION

The application of PP, used extensively in the epidemiology of alcohol-related problems, also appears to have utility in the context of gambling. Thus, the PP appears to be present in Great Britain. Although the individual risk of gambling-related harm was highest among heavy gamblers (i.e., high time and expenditure), a higher proportion of those, who reported low- to moderate-gambling volume (who represent the majority of the population) had at least

Table 4. Distribution of self-reported gambling-related harms by different segment of gambling volume

	One or more gambling-related harms (n [%]) ^a		Possible dependence (chasing losses)
	Dependence harms ^b	Social harms ^c	
Non-high time and spend (n = 3535)	693 (65.0)	65 (41.2)	309 (58.2)
High time only, high spend only (n = 354)	184 (17.2)	37 (23.4)	98 (18.5)
High time and spend (n = 258)	190 (17.8)	56 (35.4)	124 (23.3)
Total	1274 (100.0)	171 (100.0)	610 (100.0)

^aWeighted %; unweighted n. ^bFive of the ten DSM-IV items relate to difficulties in controlling gambling (salience, increased tolerance, impaired control, withdrawal symptoms, mood modification) and, in this study, were categorized as dependence harms. ^cThe other four DSM-IV items (illegal acts, problems with spouse and/or other people, work-related problems, and financial problems) are considered social harms.

Table 5. Odds ratios (95% CI) for reporting gambling-related harms in relation to demographics and gambling volume

	One or more gambling-related harms		Possible dependence (chasing losses)
	Dependence harms ^a	Social harms ^b	
Gender			
Female	1	1	1
Male	1.93 (1.65–2.27)	1.90 (1.28–2.83)	1.26 (1.03–1.55)
Age group			
55+	1	1	1
35–54	2.21 (1.81–2.70)	3.08 (1.69–5.62)	2.42 (1.81–3.25)
16–34	4.69 (3.82–5.75)	7.27 (4.11–12.88)	6.46 (4.87–8.57)
Volume grouping of regular (monthly or more) gamblers			
Non-high time and spend	1	1	1
High time only, high spend only	4.17 (3.28–5.30)	5.14 (3.34–7.92)	3.62 (2.75–4.76)
High time and spend	9.72 (7.16–13.18)	10.63 (7.09–15.92)	8.41 (6.28–11.26)
Nagelkerke R^2	0.25	0.23	0.22

Note. Bold figures indicate statistical significance at p level <.001.

^aFive of the ten DSM-IV items relate to difficulties in controlling gambling (salience, increased tolerance, impaired control, withdrawal symptoms, mood modification) and in this study were categorized as dependence harms. ^bThe other four DSM-IV items (illegal acts, problems with spouse and/or other people, work-related problems, and financial problems) are considered social harms.

one gambling-related harm compared to high-volume gamblers (who represent the minority). This suggests that prevention of gambling might need to consider the population-approach to gambling harm (in addition to the more traditional high-risk approach).

There is limited possibility for comparison with other studies, because only one previous Finnish study has reported the extent and distribution of gambling harm on the population, although gambling-related harms in that study were assessed using the PGSI. The results of this study correspond well with the findings from the Finnish study (Raisamo et al., 2014). In both studies, gender and age were salient factors for harm experience. The prevalence of harms was higher in males than females and in younger age groups than older age groups. The likelihood of harm experience increased substantially with being a young male (aged 16–34 years). In addition, by problem gambling severity, the findings demonstrated that gambling-related harm is distributed across low- to moderate-risk gamblers, and not limited to just problem gamblers. More specifically, results indicated that most low-risk gamblers exhibited at least one dependence harm and chasing losses. In this regard, it is important to note that dependence harms – not dependence diagnoses – were analyzed (i.e., people were considered “problem” cases even if they exhibited one problem). Consequently, low-severity cases can make substantial contributions to at least one gambling-related harm. One difference from the Finnish study is that the present study provides information about other harms (e.g., illegal acts, problems with spouse, and/or other people, work-related problems), which were not considered in the Finnish study. These findings are consistent with general population data on PP and alcohol problems, which show that when taking into account the large size of these low-risk groups, the relatively isolated problem episodes seen among people at lower levels of severity add up quickly, contributing to a PP for dependence (Caetano et al., 2012).

Despite dependence harms and chasing losses, the distribution of self-reported social harm was slightly higher on

two moderate-risk/problem groups. There is no obvious reason why this may have been the case but may simply have been because individuals in these groups may have been in more stable relationships and/or in paid work and therefore endorsed these items more than those that were single and/or unemployed (as the latter cannot have relationship or job-related harms and problem gamblers may have already lost their jobs and/or their partners due to their gambling harms). Otherwise, the distribution of self-reported social harm was slightly higher among the majority of gamblers, who were non-high time and spend regular gamblers than high time and spend regular gamblers (who represent the minority). In this context, we determine that low gambling volume (gambling <7 hr/month, spending less than £61.50/month), and not limited to just excessive gambling, may lead to adverse social and/or economic consequences such as relationship breakdown, job loss, and financial problem.

This study is the first to show how at least one gambling-related harm is reported by the majority of gamblers, who were non-high time and spend regular gamblers than high time and spend regular gamblers, even though the likelihood of experiencing harm increases substantially with more time and money spent-per-month on gambling (Currie et al., 2006; Raisamo et al., 2014). Moreover, this study also indicates that patterns of gambling participation (gambling volume as expressed by time and money spent gambling) – not gambling severity alone – have an important association with gambling-related harm in Great Britain (as elsewhere). This study’s identification of low-risk thresholds based on time and money spent on gambling in the past month is preliminary (based on the 90/10 split of the sample), but the overall approach appears to have merit. In the absence of a conceptual rationale for establishing such a threshold, and considering that previous attempts have failed to arrive at an adequate index of gambling participation (Blaszczynski, 2009; Rodgers et al., 2009), we opted for an empirical approach that considered the top 10% of regular gamblers (as high-risk thresholds) and the other 90% of gamblers.

The analyses on the PP in Great Britain showed that gambling-related harms were reported even among those that spent little time gambling (i.e., those who generally spent <7 hr a month gambling – a mean of 30 min/month) and among those that spent little money gambling (i.e., those who spent less than £61.50 – mean expenditure £14.82/month). Therefore, this study suggests that general gambling control policies directed at lowering time and money spend on gambling in the population (such as taxation and gambling availability control) appear warranted. Analogous to alcohol, single binge-gambling episodes may lead to serious consequences given the absence of any restraint on involvement beyond access to money and fatigue (Griffiths, 2006).

Based on Blaszczynski (2009) and Rodgers et al. (2009), this study posits that delineating the broad range of social, personal, and economic harms consequent to gambling across all levels of participation allows researchers in the gambling studies field to gain deeper insights, not only into gambling impact but public health resources and rehabilitation programs required to minimize harm and its specific types. It will enable researchers to determine the extent to which gambling exacerbates directly and indirectly on other interpersonal and psychological dysfunctions and health-related harm, and vice versa.

Strengths and limitations

This study's findings should be understood in the context of the limitations. First, as a cross-sectional survey, there is a range of potential biases that could influence results. Overall response rate was relatively low (47%), meaning more people did not participate than those who did. Since the problem with decreasing response rates in surveys, the response rate of 47% obtained in the current study is considered as acceptable (Morton, Bandara, Robinsos, & Carr, 2012). Second, assessment of gambling-related harm was not completely satisfactory. The picture of gambling harm was arguably insufficient as the modified version of the DSM-IV gambling items only covered only a few domains where harm occurs. In addition, the sum of gambling harms may not be an appropriate proxy for problem gambling severity. The distribution of the “count” of gambling-related harms needs investigation in future studies. It would be also interesting to examine the PP with a less liberal criterion of two or more gambling-related harms. Third, data were self-report and subject to standard limitations (e.g., memory recall biases, social desirability, etc.). Fourth, although the overall sample size was large, the base sizes for some regular gambler subgroups were small. However, the categorization attempt of regular gamblers by gambling volume (time/money spent) is a valuable benchmark, and further development of measures of gambling participation will be developed (Rodgers et al., 2009). Consequently, the subgroups presented in this study are not definitive. It is plausible further subgroups exist and other analytical techniques could perhaps be used to examine this (e.g., mediums of gambling access [Canale, Santinello, & Griffiths, 2015]). However, one advantage of the BGPS 2010 dataset is that there is information on time spent.

Previous studies (Currie et al., 2006; Raisamo et al., 2014) did not collect such information.

These limitations notwithstanding, two primary conclusions from this analysis can be drawn. First, the PP is a promising way of examining gambling-related harm. In addition to high-risk approaches, population-approaches for preventing gambling harm appear crucial and could shift the population distribution of gambling harm downward. Second, development of “low-risk” gambling limits based on gambling volume appears feasible (Auer & Griffiths, 2013). It should be noted that the limits proposed here are not intended to be final or definitive in any way. The low-risk limits proposed are tentative and are intended to serve as working guidelines for researchers, clinicians, and policy makers to examine for further research and consideration.

Funding sources: None.

Authors' contribution: NC analyzed the data and wrote the first draft. NC, AV, and MDG contributed to the interpretation of the data and the writing of the paper.

Conflict of interest: The authors declare no conflict of interest.

REFERENCES

- Abbott, M., Binde, P., Hodgins, D., Korn, D., Pereira, A., Volberg, R., & Williams, R. (2013). *Conceptual framework of harmful gambling: An International Collaboration*. Guelph, Ontario: Ontario Problem Gambling Research Centre.
- American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: American Psychiatric Association.
- American Psychiatric Association (2013). *Diagnostic and statistical manual of mental health disorders* (5th ed.). Washington, DC: American Psychiatric Association.
- Auer, M., & Griffiths, M. D. (2013). Limit setting and player choice in most intense online gamblers: An empirical study of online gambling behaviour. *Journal of Gambling Studies*, 29, 647–660. doi:10.1007/s10899-012-9332-y
- Blaszczynski, A. (2009). Problem gambling: We should measure harm rather than ‘cases’. *Addiction*, 104, 1072–1074. doi:10.1111/j.1360-0443.2009.02505.x
- Blaszczynski, A., Ladouceur, R., Goulet, A., & Savard, C. (2008). Differences in monthly versus daily evaluations of money spent on gambling and calculation strategies. *Journal of Gambling Issues*, 21, 98–105. doi:10.4309/jgi.2008.21.9
- Brosowski, T., Hayer, T., Meyer, G., Rumpf, H. J., John, U., Bischof, A., & Meyer, C. (2015). Thresholds of probable problematic gambling involvement for the German population: Results of the Pathological Gambling and Epidemiology (PAGE) Study. *Psychology of Addictive Behaviors*, 29(3), 794–804. doi:10.1037/adb0000088

- Caetano, R., Mills, B., Pinsky, I., Zaleski, M., & Laranjeira, R. (2012). The distribution of alcohol consumption and the prevention paradox in Brazil. *Addiction, 107*, 60–68. doi:10.1111/j.1360-0443.2011.03567.x
- Canale, N., Santinello, M., & Griffiths, M. D. (2015). Validation of the reasons for gambling questionnaire (RGQ) in a British population survey. *Addictive Behaviors, 45*, 276–280. doi:10.1016/j.addbeh.2015.01.035
- Currie, S. R., Hodgins, D. C., Wang, J., El-Guebaly, N., Wynne, H., & Chen, S. (2006). Risk of harm among gamblers in the general population as a function of level of participation in gambling activities. *Addiction, 101*(4), 570–580. doi:10.1111/j.1360-0443.2006.01392.x
- Currie, S. R., Miller, N., Hodgins, D. C., & Wang, J. (2009). Defining a threshold of harm from gambling for population health surveillance research. *International Gambling Studies, 9*(1), 19–38. doi:10.1080/14459790802652209
- Ferris, J., & Wynne, H. (2001). *The Canadian problem gambling index*. Ottawa, Ontario: Canadian Centre on Substance Abuse.
- Gainsbury, S. M., Russell, A., Hing, N., Wood, R., Lubman, D. I., & Blaszczynski, A. (2014). The prevalence and determinants of problem gambling in Australia: Assessing the impact of interactive gambling and new technologies. *Psychology of Addictive Behaviors, 28*(3), 769–779. doi:10.1037/a0036207
- Galani, C., & Schneider, H. (2007). Prevention and treatment of obesity with lifestyle interventions: Review and meta-analysis. *International Journal of Public Health, 52*(6), 348–359. doi:10.1007/s00038-007-7015-8
- Gmel, G., Klingemann, S., Müller, R., & Brenner, D. (2001). Revising the preventive paradox: The Swiss case. *Addiction, 96*(2), 273–284. doi:10.1046/j.1360-0443.2001.96227311.x
- Griffiths, M. (1996). Pathological gambling and treatment. *British Journal of Clinical Psychology, 35*(3), 477–479. doi:10.1111/j.2044-8260.1996.tb01201.x
- Griffiths, M. D. (2006). A case study of binge problem gambling. *International Journal of Mental Health and Addiction, 4*(4), 369–376. doi:10.1007/s11469-006-9035-7
- Griffiths, M., & Delfabbro, P. (2001). The biopsychosocial approach to gambling: Contextual factors in research and clinical interventions. *Journal of Gambling Issues, 5*, 1–33. doi:10.4309/jgi.2001.5.1
- Griffiths, M. D., & Whitty, M. W. (2010). Online behavioural tracking in Internet gambling research: Ethical and methodological issues. *International Journal of Internet Research Ethics, 3*(12), 104–117.
- Korn, D., Gibbins, R., & Azmier, J. (2003). Framing public policy towards a public health paradigm for gambling. *Journal of Gambling Studies, 19*(2), 235–256. doi:10.1023/A:1023685416816
- Lorains, F. K., Cowlshaw, S., & Thomas, S. A. (2011). Prevalence of comorbid disorders in problem and pathological gambling: Systematic review and meta-analysis of population surveys. *Addiction, 106*(3), 490–498. doi:10.1111/j.1360-0443.2010.03300.x
- Marshall, D. (2009). Gambling as a public health issue: The critical role of the local environment. *Journal of Gambling Issues, 23*, 66–80. doi:10.4309/jgi.2009.23.4
- Meyer, G., Hayer, T., & Griffiths, M. D. (Eds.). (2009). *Problem gambling in Europe: Challenges, prevention, and interventions*. New York, NY: Springer.
- Milosevic, A., & Ledgerwood, D. M. (2010). The subtyping of pathological gambling: A comprehensive review. *Clinical Psychology Review, 30*(8), 988–998. doi:10.1016/j.cpr.2010.06.013
- Molinaro, S., Canale, N., Vieno, A., Lenzi, M., Siciliano, V., Gori, M., & Santinello, M. (2014). Country-and individual-level determinants of probable problematic gambling in adolescence: A multi-level cross-national comparison. *Addiction, 109*(12), 2089–2097. doi:10.1111/add.12719
- Morton, S., Bandara, D. K., Robinson, E. M., & Carr, P. E. A. (2012). In the 21st century, what is an acceptable response rate? *Australian and New Zealand Journal of Public Health, 36*(2), 106–108. doi:10.1111/j.1753-6405.2012.00854.x
- Nower, L., Martins, S. S., Lin, K. H., & Blanco, C. (2013). Subtypes of disordered gamblers: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Addiction, 108*(4), 789–798. doi:10.1111/add.12012
- Petry, N. M., Blanco, C., Jin, C., & Grant, B. F. (2014). Concordance between gambling disorder diagnoses in the DSM-IV and DSM-5: Results from the National Epidemiological Survey of Alcohol and Related Disorders. *Psychology of Addictive Behaviors, 28*(2), 586–591. doi:10.1037/a0034661
- Raisamo, S. U., Mäkelä, P., Salonen, A. H., & Lintonen, T. P. (2014). The extent and distribution of gambling harm in Finland as assessed by the Problem Gambling Severity Index. *European Journal of Public Health, 25*(4), 716–722. doi:10.1093/eurpub/cku210
- Reith, G. (2012). Beyond addiction or compulsion: The continuing role of environment in the case of pathological gambling. *Addiction, 107*(10), 1736–1737. doi:10.1111/j.1360-0443.2012.03669.x
- Rodgers, B., Caldwell, T., & Butterworth, P. (2009). Measuring gambling participation. *Addiction, 104*(7), 1065–1069. doi:10.1111/j.1360-0443.2008.02412.x
- Rose, G. (1981). Strategy of prevention: Lessons from cardiovascular disease. *British Medical Journal, 282*, 1847–1851. doi:10.1136/bmj.282.6279.1847
- Rossow, I., & Romelsjö, A. (2006). The extent of the ‘prevention paradox’ in alcohol problems as a function of population drinking patterns. *Addiction, 101*(1), 84–90. doi:10.1111/j.1360-0443.2005.01294.x
- Skog, O. J. (2006). Alcohol and the so-called prevention paradox: How does it look today? *Addiction, 101*(2), 155–158. doi:10.1111/j.1360-0443.2006.01319.x
- Slutske, W. S., Eisen, S. A., True, W. R., Lyons, M. J., Goldberg, J., & Tsuang, M. T. (2000). Common genetic vulnerability for pathological gambling and alcohol dependence in men. *Archives of General Psychiatry, 57*, 666–673. doi:10.1001/archpsyc.57.7.666
- Slutske, W. S., Eisen, S. A., Xian, H., True, W. R., Lyons, M. J., Goldberg, J., & Tsuang, M. (2001). A twin study of the association between pathological gambling and antisocial personality disorder. *Journal of Abnormal Psychology, 110*, 297–308. doi:10.1037/0021-843X.110.2.297
- Slutske, W. S., Jackson, K. M., & Sher, K. J. (2003). The natural history of problem gambling from age 18 to 29. *Journal of Abnormal Psychology, 112*(2), 263–274. doi:10.1037/0021-843X.112.2.263
- Sproston, K., Erens, B., & Orford, J. (2000). *Gambling behaviour in Britain: Results from the British Gambling Prevalence Survey*. London, United Kingdom: National Centre for Social Research.

- Svetieva, E., & Walker, M. (2008). Inconsistency between concept and measurement: The Canadian Problem Gambling Index (CPGI). *Journal of Gambling Issues*, 22, 157–173. doi:[10.4309/jgi.2008.22.2](https://doi.org/10.4309/jgi.2008.22.2)
- Toce-Gerstein, M., Gerstein, D. R., & Volberg, R. A. (2003). A hierarchy of gambling disorders in the community. *Addiction*, 98(12), 1661–1672. doi:[10.1111/j.1360-0443.2003.00545.x](https://doi.org/10.1111/j.1360-0443.2003.00545.x)
- Wardle, H. (2015). *Gambling behaviour in Britain*. New York, NY: Routledge.
- Wardle, H., Moody, A., Griffiths, M., Orford, J., & Volberg, R. (2011a). Defining the online gambler and patterns of behaviour integration: Evidence from the British Gambling Prevalence Survey 2010. *International Gambling Studies*, 11(3), 339–356. doi:[10.1080/14459795.2011.628684](https://doi.org/10.1080/14459795.2011.628684)
- Wardle, H., Moody, A., Spence, S., Orford, J., Volberg, R., Jotangia, D., Griffiths, M., Hussey, D., & Dobbie, F. (2011b). *British Gambling Prevalence Survey 2010*. London, United Kingdom: The Stationery Office.
- Wood, R. T., & Williams, R. J. (2007). ‘How much money do you spend on gambling?’ The comparative validity of question wordings used to assess gambling expenditure. *International Journal of Social Research Methodology*, 10(1), 63–77. doi:[10.1080/13645570701211209](https://doi.org/10.1080/13645570701211209)