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# Legacy gambling harms: What are they and how long do they last?

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## FULL-LENGTH REPORT



### ABSTRACT

*Background and aims:* Legacy gambling harms are negative consequences of gambling that extend past periods of low risk, moderate risk and problem gambling. Gambling harm is typically measured within a 12-month timeframe and is often restricted to examining harm amongst active gamblers. The present research aimed to explore whether people experienced gambling harms 12 months or more after the resolution of at-risk or problem gambling, and how long these legacy harms lasted. *Methods:* An online survey was conducted in New Zealand with past and current gamblers and concerned significant others (CSOs) of gamblers,  $N = 1,240$  (50.8% female), that asked them about both past and current gambling harms. *Results:* A majority of both gamblers and CSOs of gamblers indicated that they still suffered from gambling harm even after most of their behavioural issues with gambling had been resolved, 12+ months ago. Legacy gambling harms reduced over time, with harms diminishing most quickly in the early years, and having an average half-life of 4 years. Harms involving community-relationships, church involvement, and domestic and other violence resolved more quickly than others. *Discussion and conclusions:* Legacy harms are common among ex-problem gamblers and should be considered in any full accounting of the impacts of gambling. *Conclusion:* Understanding the time course and persistence of legacy harms from gambling can provide gamblers, treatment professionals and public health experts with insights into how to address gambling's long-term consequences.

### KEYWORDS

harm, long-term, lifetime, legacy, wellbeing, residual

## INTRODUCTION

Legacy gambling harms are negative consequences of gambling that remain after a discrete episode of problematic gambling has been largely resolved (Langham et al., 2016). These residual impacts from gambling can remain after any level of problematic gambling involvement, including low risk, moderate risk and problem gambling (Ferris & Wynne, 2001). That is, people who are in recovery from gambling problems, no matter how minor, may still suffer some legacy harms that continue to damage their wellbeing and health. Some ongoing harms may be severe and affect people's life-course (Russell et al., 2021), such as long-term employment, and may also affect the next generation; for instance, by materially or emotionally depriving the children of gamblers (Langham et al., 2016).

Past research has focused on people suffering from severe gambling disorders (Baxter, Hilbrecht, & Wheaton, 2019; Price, Hilbrecht, & Billi, 2021). However, a more recent wave of research employs a public health approach that also recognises the broader effects of gambling on people without a mental health diagnosis of disordered gambling (Wardle, Reith, Langham, & Rogers, 2019) as well as people socially connected to the gambler who are often called concerned-significant others (CSOs) or affected others (AOs). People who have lesser problems with gambling may still suffer gambling harms and can still negatively affect

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those around them (Browne et al., 2016, 2017; Browne & Rockloff, 2018). The community as a whole can also be affected by gambling problems; for example, through the costs associated with treatment and the criminal justice system (Hing, Russell, Black, Rockloff, Browne, Tulloch, & Woo, 2022). Using this public health approach, gambling harm has been conceptualised as the adverse consequences of gambling that lead to a reduction in health and wellbeing in the population (Browne et al., 2016). The benefits of this approach to harm are that negative outcomes are comprehensively measured and validated against health metrics common to other disease states. This allows a comparison of gambling harm against the negative effects of other problems on similar bases, such as alcohol abuse. The commonality helps to ensure that money and effort is best spent to improve the health and wellbeing of the population by focusing appropriately on the issues yielding the best cost-benefit calculations (Johnstone & Regan, 2020; Latvala, Lintonen, & Konu, 2019; Wardle et al., 2019). Currently, attention is being directed beyond a focus on individual gamblers as the source of harm, and extending it to include considerations around product design, regulation, legal reform, and industry practices (e.g., Abbott et al., 2013; Hilbrecht et al., 2020; Latvala et al., 2019; Price et al., 2021).

Measurement instruments including the Harm Questionnaire (HQ, Blaszczyński et al., 2015) and the Short Gambling Harms Screen (SGHS, Browne, Goodwin, & Rockloff, 2018) have provided a means for quantifying gambling harm. In particular, the SGHS has been psychometrically validated, and has the benefit of being tied to health state utilities commonly used in public health (Browne et al., 2022; McLauchlan, Browne, Russell, & Rockloff, 2020; Murray Boyle, Browne, Rockloff, & Flenady, 2021). Browne et al. (in press n.d.) has provided further validation for the SGHS (renamed the Gambling Harm Scale-10 or GHS-10) and developed a new scale (GHS-20) that provides more detail on the domains of gambling-harm (e.g., financial, relationship, etc.). This work has provided a similar set of validated measures for gambling harm to affect others (GHS-10-AO, GHS-20-AO). The authors have recognised that these instruments are only measured within a specific timeframe (past 12 months), and do not consider harm to everyone, such as the children of gamblers. Nonetheless, these scales have been used in recent prevalence studies of gambling to find that 9–10% of adults report experiencing harms in the prior 12 months related to their own gambling (ACIL, 2017; Browne et al., 2017, 2019; Hing et al., 2021; Paterson, Leslie, & Taylor, 2019; Rockloff et al., 2020; Salonen, et al., 2019; Stevens, Gupta, & Flack, 2019; Woods, Sproston, Brook, & Delfabbro, 2018). Furthermore, an estimated six people are harmed by each person with gambling problems (Goodwin, Browne, Rockloff, & Rose, 2017), which amounts to 5–11% of adults being harmed as so-called affected others or likewise CSOs (Castrén, Lind, Hagfors, & Salonen, 2021; Hing et al., 2022; Rockloff et al., 2020; Salonen, Alho, & Castrén, 2016; Stevens et al., 2019).

Although there is growing literature on the pervasive harms experienced by people with gambling problems, the estimates noted above have generally presumed that the

gambling problems are concurrent with the harm. There is little work that attempts to address, quantitatively, and within a public health framework, how legacy harms might affect people with past gambling problems. Similarly, there is little work on how concerned significant others (CSOs) might be affected by legacy harms, despite theoretical expositions of such harms (Langham et al., 2016).

Langham et al.'s (2016) framework on harms does not specify the time course of gambling problems, stating that "The framework does not attempt to capture causal sequences or pathways of harms, this would only be possible using a prospective longitudinal methodology." (p. 5). The Brain Disease Model of Addiction (BDMA) (Leshner, 1997), however, suggests that people experience addiction as a chronic, relapsing disorder. Consequently, it was our expectation that the negative consequences that people experience from problematic gambling should diminish in time with respect to the most recent episode (i.e., before a potential new relapse).

Although harms that are *concurrent* with gambling problems are well understood (Blackman, Browne, Rockloff, Hing, & Russell, 2019; Browne & Rockloff, 2018, 2020; Langham et al., 2016; Neal, Delfabbro, & O'Neil, 2005, 2018; Rockloff, Browne, Russell, Merkouris, & Dowling, 2019), the degree to which various issues persist after problems have ceased is less clear. Given the lack of attention to this question, the following basic research questions were directed at people with past gambling problems and CSOs with past problems from someone else's gambling:

1. Are these harmful consequences still evident after the cessation of problematic gambling?
2. Do legacy harms diminish over time, and at what rate?
3. Assuming legacy harms do disappear over time, are there any differences between the types of harm in how quickly they resolve? (e.g., financial, relationship, etc.)

Per Langham et al.'s (2016) harms framework, Q1 explores the assumption that some legacy harms should be evident after problematic gambling ceases. The BDMA (Leshner, 1997) suggests that, as implicit in Q2, harms diminish with distance from an acute episode. Finally, Q3 is exploratory. We are not aware of any particular theory or strong reasoning to suggest that some legacy harms might last longer than others however, this is a question with practical significance in setting expectations for recovery.

## METHODS

### Participants

Survey participants were recruited through Qualtrics, which is an aggregator of several New Zealand-based online panel providers. This was a purposive, non-probability sample aimed at gathering large numbers of gamblers and CSOs with past gambling-related problems. Qualtrics screened out duplicates and ineligible respondents who did not meet the qualifying criteria, as described below; as well as people who

finished too quickly, had patterned responding, or showed other signs of inattention. Compensation was provided for participants by the panel, most often in the form of points that could be redeemed for small-value prizes, cash or gift certificates. The survey, as described below, was open between April 8th, 2020 and May 23rd, 2020. Although participants completed the survey during the COVID-19 pandemic, questions in the survey related to their legacy-harm experiences during 2019 and earlier to avoid complications around shutdowns of gambling venues in 2020. Moreover, questions on income also related to 2019, since some people's income was often affected by the pandemic in 2020 (Fletcher, Prickett, & Chapple, 2021).

The inclusion criteria for the study was being of age 18+, living in New Zealand, and answering "yes" to the following question: "Has there been a time in your life when your gambling caused issues in your life, no matter how minor?" For the purposes of this study, we assumed and defined these "issues" as synonymous with some degree of problematic gambling, inclusive of (but not necessarily showing the existence of) low risk, moderate risk and problem gambling in the respondent's past, as defined by the PGSI. The language of "issues" was intended to avoid potential bias, since respondents may not have been willing to admit to potentially stigmatising gambling problems.

A total of 2,460 participants started the survey. Data quality checks (e.g., speeding through the survey, keyboard mashing) resulted in the removal of 420 respondents, and another 590 were removed for incomplete survey responses. The final sample included 1,450 persons, including 735 gamblers and 505 Concerned Significant Others (CSOs). Gamblers were people who admitted to 12+ month past issues with gambling. CSOs were people who did not admit to issues with their own gambling, but nevertheless answered "yes" to the question: "Have you had a close relationship\* with a person whose gambling has caused issues in your life, no matter how minor?" The footnote to this question (\*) said, "When we talk about a close relationship, we are referring to a personal relationship with someone that you care about and have had regular communication with."

## Measures

**Time since problematic gambling ceased.** Participants were asked about the most recent time "...in your life where gambling caused issues for you, no matter how minor", and provided dates, including the year and month (if known) when "most" of these issues started and ended. The time (year and month) when the problem ended was subtracted from the time when the survey was completed (Apr 8–May 23, 2021) to form the instrumental variable for subsequent analyses. For simplicity of exposition, this variable is hereafter referred to as "time." Thus, for example, people who were experiencing current issues with gambling have time recorded as "0".

**Problem gambling severity index.** The Problem Gambling Severity Index (PGSI) is a 9-item scale for measuring gambling problems. Each question, such as "have you ever bet

more than you could afford to lose?" is rated on a scale ranging from 0 = never to 3 = almost always and referred only to symptoms experienced within the last 12 months from survey administration. Summed scores classify gamblers into four groups, including 0 = non-problem, 1–2 low-risk, 3–7 high-risk, and 8+ problem gambler (Ferris & Wynne, 2001).

**Gambling harms.** Respondents completed a checklist of 83 potential harms (y/n) that can occur as a result of gambling (Browne et al., 2017). By design, these harms used, "phrasing that was similar regardless of whether the source of the harms was one's own gambling, or someone else's gambling. This facilitated comparisons between the two groups." (p. 130). Harms questions had minor wording variation to account for whether the harm originated from "your past gambling" (for gamblers) or "HIS or HER past gambling" (for CSOs). Harms were grouped into financial, relationship, emotional and psychological, health, work/study, and "other" harms inclusive of cultural harms and social deviance. Participants were asked to check each harm that they experienced during the most recent episode of gambling. For participants who had their last gambling issues at least 12 months distant from the time of the survey, they were subsequently asked to check off those same harms that "... still affected you at Sometime Within The Last 12 Months due to gambling that happened in the past." Participants were also given the opportunity to add new harms that were not yet identified from gambling that took place *more* than 12 months ago. Nevertheless, the few responses gathered from this additional question only reiterated prior harms, often with some new details, and thus these responses were not included in the analyses below.

Murray Boyle et al. (2021) established that harms experienced at an individual level constitute a unitary construct as conceptualised by item-response theory. In other words, the presence or absence of specific symptomatology reflects both differing degrees of item severity, and also a latent degree of global harm experienced by individuals at a given time. This finding justifies our later analyses aggregating harms into larger constructs grouped along the functional domains as detailed above (i.e., financial, relationship, etc.).

## Procedure

Rockloff et al. (2022) published the full survey instrument, inclusive of the information sheet and consent form. The survey took about 20 min to complete. Participants were preferentially classified as gamblers if they reported some past issues with their own gambling. People who did not report past issues with their gambling were asked if they had issues that occurred due to someone else's gambling, and these participants are identified below as concerned significant others (CSOs).

## Statistical analyses

Of the 1,450 valid completes for the survey, 210 persons indicated that their gambling problems were ongoing within the last 12 months. To address the specific problem of the present study, the analyses were restricted to the 1,240 remaining cases,



which included 735 persons reporting on harm from their own past gambling, and 505 CSOs who had reported harm from someone else's past gambling. All statistical analyses were conducted at an alpha level of significance of  $P < 0.01$ .

Linear mixed effect modelling (LME) was used to estimate the rate of decay in the likelihood of selecting harms from the past issue with gambling (i.e., a last-12-month continuing harm) based on the time elapsed between the issues and survey completion. LME modelling is applicable to the present data given its utility in tracking individual-level changes in outcomes over time. As noted by Ghisletta, Renaud, Jacot, and Courvoisier (2016), life course researchers often collect longitudinal data by repeatedly assessing the same individuals over time. Such data are inherently dependent, that is, errors are correlated between observations within the same individual. Thus, they cannot be analysed with standard classical models, like ordinary least squares regression, because these assume independent (uncorrelated) errors for all observations, which would lead to incorrect statistical inference about the estimated parameters. The underlying assumption of these analyses was that increased distance in time from the gambling issue would lower the likelihood of the harm continuing to occur. The half-life of each harm was calculated from this model to give estimates of when, in year-distance, a randomly chosen harm from each category, financial, relationship, etc., is just 50% likely to still affect a gambler.

The half-life of a process refers to the time it takes for a quantity to reduce to half of its initial value. When the decline is occurring at a constant rate, i.e., an exponential decay as modelled in this analysis, then the half-life is constant over the lifetime of the process. For example, if it takes 10 years for 50% of a radioactive isotope to decay, then after another 10 years, then a further 50% of the remainder will have decayed, leading to 25% of the initial quantity. The half-life (of 10 years in this example) is an intuitive way to describe the rate of decay, with shorter half-lives corresponding to faster rates of decay. In the present analysis, the quantity of interest is the probability of experiencing a given gambling harm, and the half-life is the time required for the likelihood of reporting that harm to halve.

Time-decay trajectories were not calculable for individual harms as opposed to categories of harm. The diverse nature of specific gambling harms entails that positive observations of the 83 harms were relatively sparse. Instead, a simpler solution was employed to estimate specific harms that were relatively short- vs. long-lived. For each legacy harm that was identified as ongoing within the last 12 months, the *mean number of years since the most recent gambling issue* was calculated. Using this metric, gambling harms that are relatively short-lived should have lower means, and correspondingly, gambling harms that are relatively longer-lived should have a high mean score.

## Ethics

Ethics: Conduct of the research was carried out in accordance with the Declaration of Helsinki. The study was approved by Central Queensland University's Human

Research Ethics Committee (HREC # 22,278), which operates in accordance with the National Statement on Ethical Conduct in Research published by the National Health and Medical Research Council of Australia

## RESULTS

### Demographic profile of sample

The demographic characteristics of each sample, including gamblers and CSOs with past gambling-related issues, 12+ months distant, are shown in Table 1. Most characteristics were somewhat similar, although there was a higher proportion of female respondents who were CSOs.

### Are harmful consequences ongoing?

A slight majority of gamblers (417, 56.7%) experienced at least some continuing harm from past gambling, having a median of three legacy harms (IQR 2,7). Similarly, most CSOs also reported having some legacy gambling harm (291 or 57.6%), also with a median of three harms chosen (IQR 3,6). In the sample, the median time since gambling problems had ceased was 1.8 years (IQR 0.25,9.1). These findings answered the first question posed in the introduction by verifying that people believe at least some gambling harm is ongoing, even after suggesting that "most" of their "issues" with gambling are no longer relevant (as of 2 years ago, on average).

### Do legacy harms reduce over time?

Bivariate correlations were used to determine whether legacy harms demonstrated a reliable reduction with distance from the end of the most recent issues with gambling; that is, with more time past problem-resolution. As expected, the number of reported legacy harms decreased with respect to the distance in time from when the most recent gambling issue was resolved,  $r = -0.15$ ,  $P < 0.01$ . However, for CSOs there was no significant decrease in the report of gambling harm with respect to time,  $r = -0.05$ ,  $P > 0.01$ , ns. Consequently, subsequent analyses using LME were only run using gamblers and not CSOs, since the significant reduction in harm over time was not evident for the latter.

Table 2 shows the LME models for each of the six domains of harm outlined by Langham et al. (2016). The probability of reporting harm within each domain was predicted as a function of time, expressed as log (days +1) distant from a past issue with gambling. As shown, presence of harm significantly decreased for all domains except for work/study harms. Work/study harms, however, had lower power due to the relative rarity of harms within this domain. In addition, the beta coefficient for work/study was comparable and slightly higher than the health domain; the latter of which proved significant owing to higher power.



Table 1. Demographic profile of 1,240 case sample used for analyses

Variable	Gamblers ( <i>n</i> = 735)		CSOs ( <i>n</i> = 505)	
Age	42.4	SD = 15.6	40.9	SD = 16.7
Gender	42.7%	female	62.6%	female
Annual Household Income	\$78–104K	Median	\$78–104K	Median
Urban location (not rural)	48.4%		46.9%	
Ethnicity	71.3%	European/Other	71.5%	European/Other
	14.1%	Māori	14.3%	Māori
	10.7%	Asian	10.3%	Asian
	3.8%	Pacific	4.0%	Pacific
Problem Gambling Severity Index (last 12 mo)	34.1%	Non-prob.	77.6%	Non-prob.
	14.1%	Low risk	11.1%	Low risk
	20.5%	Mod. risk	6.7%	Mod. risk
	31.2%	Problem	4.6%	Problem
CSO type		N/A	27.1%	Close friend
			26.1%	Partner/spouse
			15.6%	Parent
			15.2%	Other whānau or family member
			6.1%	Sibling (brother or sister)
			6.1%	Co-worker/colleague
			2.2%	Child
			1.4%	Other

Table 2. Summary of GLME models predicting probability of reporting harm within each domain as a function of time (gamblers only)

	Link function: Binomial (logit)					
	Dependent variable: <i>p</i> (harm)					
	Financial	Relat.	Emotional/Psych.	Health	Work/Stud.	Other
Fixed effects B (SE)						
log (time +1)	−0.862* (0.092)	−0.962* (0.149)	−0.969* (0.126)	−0.779* (0.167)	−0.797 (0.342)	−0.839* (0.323)
Constant	−2.953* (0.356)	−3.966* (0.306)	−2.882* (0.255)	−5.544* (0.700)	−9.046* (0.716)	−8.535* (0.650)
Random effects SD						
Response ID <sup>a</sup>	1.584	2.481	2.189	3.222	6.246	5.790
Harm ID <sup>b</sup>	1.302	0.305	0.514	0.537	0.739	0.565
Observations	10,448	8,489	7,183	10,448	7,836	10,448
Log Likelihood	−2,128.14	−1,305.03	−1,603.56	−1,318.07	−533.36	−658.40
Akaike Inf. Crit.	4,264.28	2,618.07	3,215.13	2,644.13	1,074.72	1,324.80
Bayes. Inf. Crit.	4,293.29	2,646.25	3,242.64	2,673.15	1,102.58	1,353.81

Note: \*  $P < 0.01$ , <sup>a</sup> The standard deviation of random intercepts across individuals, <sup>b</sup> The standard deviation of random intercepts across specific harms within each domain.

### Are there domain differences in the rate of harm reduction with time?

The expected probabilities for these fitted models are illustrated in Fig. 1. Some harm domains, such as emotional and psychological harms, are generally more frequent and thus the probability curves are higher across time periods. The log gradient in the reduction of harm across time for each domain is relatively constant. This observation is a property of the similar beta-weights for time shown in Table 2. The similarities are validated by a test employing the standard errors,  $t(1) = 0.817$ ,  $P = 0.56$ , ns.

### Half-life of legacy harms

To lend greater interpretability to Table 2, the probability model was used to calculate the half-life of legacy gambling harms in each domain. The half-life was calculated as the time when it is likely that a randomly chosen legacy harm, once suffered by a gambler, is still likely to remain as a continuing harmful consequence. Similarly, probabilities for 75% and 25% likelihoods for legacy harms remaining are also shown. As illustrated in Table 3, the average half-life of legacy harms was 4.0 years. Financial harms had the longest half-life at 5.0 years, and the “Other” domain of harms had the shortest half-life at 2.2 years.



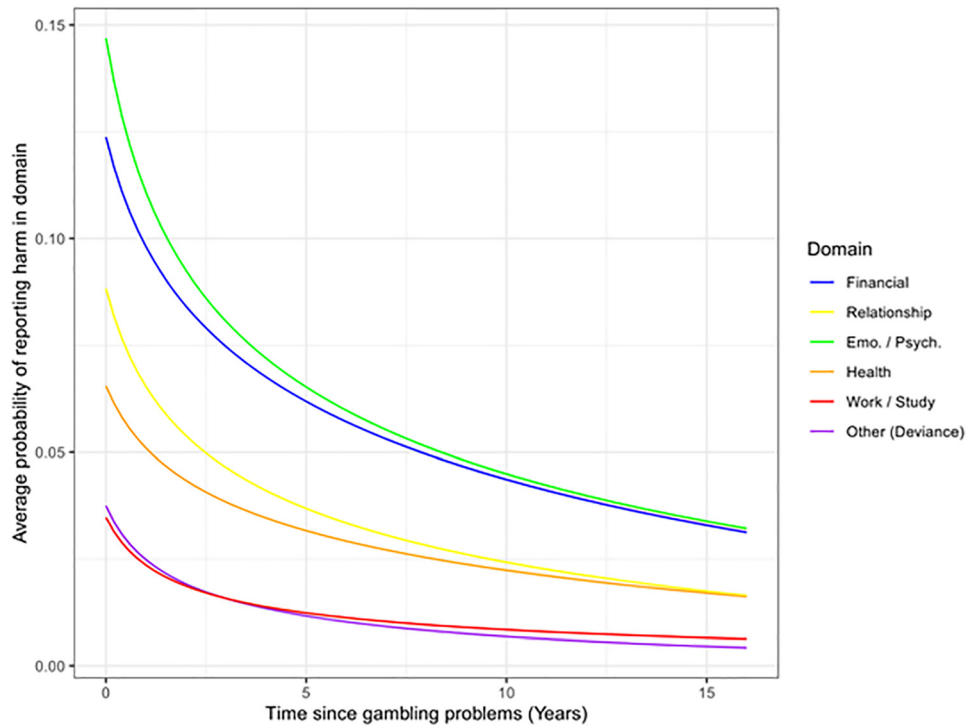


Fig. 1. Average estimated probability of gamblers reporting harms within each domain as a function of time

Table 3. Half-life of legacy gambling harms

	Likelihood that a single harm, chosen at random <sup>[2]</sup> , remains...		
	75%	50%	25%
Financial	1.4 yrs	5.0 yrs	16.0 yrs
Relationship	1.0	3.4	11.4
Emotional/Psych.	1.0	3.8	13.4
Health	1.2	4.6	15.8
Work/Study	0.6	2.4	9.6
Other	0.6	2.2	6.8
Average <sup>[1]</sup>	1.1	4.0	13.5

<sup>[1]</sup> The average-calculation is weighted by the prevalence of harms in each category.

<sup>[2]</sup> Figures shown are an estimate of the half-life for one specific harm chosen at random within each domain, including Financial, Relationship, etc.

### Long- and short-lived legacy harms

The LME models, however, could not be employed to explore whether individual harms (e.g., late payment of bills due to gambling) were relatively long- or short-lived, since many of the 83 harms were relatively rare (cf., Browne et al., 2017). There were too few observations of each harm to make stable estimates via LME for the mean length of all 83 harms. Instead, the mean number of years since the most recent gambling issue was calculated for each legacy harm. Relatively short-lived harms should have a lower mean than other harms, whereas long-lived harms should have a high mean. The mean scores are only relative measures that are

valid for this sample, however, and the half-life calculations shown in Table 3 should be used for estimates of the typical length of legacy harms. Table 4 shows legacy harms that depart significantly from the grand mean score for all harms ( $M = 2.75$ ) after applying a Holm-correction for multiple tests (83). All harms identified as significant in Table 4 are more short-lived than the average.

### DISCUSSION

People who lose a job due to gambling may still be unemployed even after they resolve their issue with gambling. Legacy harms are residual effects of gambling problems that have been resolved in the past but still affect the individual, their close contacts or the community at large.

Gambling harm for practical reasons of recall accuracy, and for consistency, are often measured referencing the past 6–12 months (Browne et al., 2018; Shannon, Anjoul, & Blaszczyński, 2017). Consequently, gambling harm is usually measured only in relation to people who gambled within the last 6–12 months (or their contacts), and thus such measurement can exclude the possibility of continuing harms amongst people who no longer actively gamble. Legacy gambling harm can be obscured or ignored using dominant methods and may underestimate the negative effects of gambling in the community.

This current study aimed to see if legacy harms are nominated by people who have resolved most of their issues with gambling behaviour in the past, at least 12+ months distant. The results revealed that a majority of gamblers with

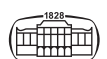


Table 4. For gamblers who experienced each legacy harm (see count), a calculation of the mean number of years since the most recent gambling issue (only significant findings shown<sup>^</sup>)

	Mean Years	Std Dev	Count	1-sample t <sup>^</sup>	P-value
Outcast from community due to involvement with gambling	0.44	0.23	11	−33.40	<0.01*
Outcast from church due to involvement with gambling	0.55	0.36	12	−21.22	<0.01*
Had experiences with violence (include family/domestic violence)	0.94	1.36	19	−5.79	<0.01*

<sup>^</sup> Note: differences from grand mean 2.75 years.

\*  $P < 0.01$  with Holm-correction applied.

past problems, as well as CSOs with someone who had caused them issues, still suffered from lingering legacy harms. A better understanding of these legacy harms can provide insight for gamblers in recovery. It can set expectations for how their lives might improve in recovery.

### Reductions in gambling harms over time

Legacy gambling harms should reduce with greater distance from past problems with gambling. The results showed that legacy harms amongst gamblers decreased with time from past issues. The same decrease was not evident for CSOs. It is not clear why this is the case, although it may be that CSOs' problems were less severe. It is worth noting that the correlations between harm and time for CSOs was negative ( $r = -0.05$ ), as predicted, but just not at a significant level (i.e.,  $\alpha = 0.01$ ).

The rate of reduction in harm was well represented by a logistic log function of time, meaning that the underlying propensity for harm (i.e., the linear predictor in the GLM) declines at a constant proportional rate. The probability of reporting a specific harm was a logistic function of this underlying propensity (see Fig. 1). There was no substantial or significant difference in the rate of logistic decay in harms based on the broad domains of harm, such as financial, relationship, etc., as shown by the similar beta weights for Time in Table 2. Importantly, however, the more common legacy harms tended to persist for a longer period by virtue of an initially higher base-rate. Consequently, financial and emotional legacy-harms were the most persistent overall, since so many people had these harms in the first instance (i.e., during the period of their gambling problems).

The LME modelling allowed for a calculation of the half-life of legacy harms, which provided important practical insights into how long legacy harms might be expected to last past the end of gambling-related behavioural problems. On average, legacy harms had a half-life of 4 years, meaning that people with particular legacy harm were at least 50% likely to be free of that harm after 4 years in recovery. Financial harms had the longest half-lives at 5 years, whereas "other" harms, including cultural and social deviance harms, had the shortest half-lives at 2.2 years. It is important for gamblers to be aware, therefore, that the financial consequences of gambling problems can be long-lasting. Treatment approaches, including financial counselling, should incorporate means to address these long-term financial

problems, rather than only addressing immediate financial crises caused by problematic gambling.

The diversity and relative rarity of individual types of harm made the LME modelling impractical for use in determining which of the 83 specific harms were short or long-lived. Instead, the *mean number of years since the most recent gambling issue* was calculated for each legacy harm. Low mean values should be associated with relative short-lived harms, whereas high means should be associated with long-lived harms. Each harm was compared with a *t*-test to the grand mean for legacy harms. Legacy harms related to community and church involvement were relatively more short-lived than other harms. In addition, the legacy harm of *experiences of domestic and other violence* related to gambling was also more short-lived. These were exploratory findings. It may be that people's relationship problems are more affected by immediate gambling problems than the aftermath of gambling involvement, although the reasons for these findings could be the subject of future research. These short-lived harms can give gamblers in recovery hopeful indications for how quickly these issues can be resolved. It should be noted that only 3 of 83 harms had resolutions that were different (and faster) than the mean time for resolution of gambling-harms. This relative rarity, however, is partly explained by the high-bar of adjusting the probabilities for the effects of multiple comparisons.

### Implications

Gamblers in recovery should be prepared to understand that some harm will continue after problematic gambling engagement ends. These long-term harms, if broadly understood by the public, may have a prophylactic benefit. Communities can develop strategies to reduce gambling involvement by promotion of its long-term negative consequences. More positively, counselling services can better inform clients about their path to recovery and help them to develop strategies to reduce ongoing harms. Governments and regulators should incorporate the costs of legacy harms into their considerations for possible gambling expansion, since prior methods tend to underestimate the total social costs.

### Limitations

An important limitation to the present results include the common issues involving recall biases. Rockloff et al. (2022)



partially addressed this issue by noting that ongoing legacy harms were reliably related to decrements in wellbeing, as measured by the Australian Unity Wellbeing Index (Cummins, Eckersley, Pallant, van Vugt, & Misajon, 2003) and SF-6D (Brazier, Roberts, & Deverill, 2002). Nevertheless, some recall bias in the absolute quantity of past harms identified may remain. The current methodology also relies on the identification of a discrete episode of problem gambling behaviour that had ended at least 12+ months before survey administration. The reality of gambling problems may be somewhat more nuanced, where problem gambling behaviour cycles more quantitatively rather than episodically. Although the survey included participants from each of the main ethnic backgrounds common in New Zealand, the sparsity of gambling-harms precluded a comparison between these groups. Lastly, the survey asked about harms being present or absent, whereas there may have been some unmeasured reduction in the seriousness of each harmful outcome during the period of recovery. Limiting assumptions may be explored in future research.

## Conclusion

Legacy gambling harms are an understudied and often overlooked consequence of excessive gambling involvement. Typical measurement paradigms for gambling harm use a timeframe of the past 6 or 12-months, and may not consider harms to people who are not actively involved in gambling. The present study found that lingering harms from gambling that occur more than 12 months after the resolution of low risk, moderate risk and problem gambling are common. Legacy harms reduce over time, with the most rapid declines occurring in early years. A specific legacy harm, chosen at random, is about 50% likely to still be affecting a gambler after 4 years in recovery. Harms related to community and church involvement and to domestic and other violence are some of the earliest to resolve. This research provides valuable information for gamblers regarding their expectations for recovery and should help inform protective efforts aided by treatment professionals and public health experts.

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