Time and money spent gambling and the relationship with quality-of-life measures: A national study of New Zealanders

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Abstract

This study provides quantitative measures of the impacts of gambling from a general population sample exposed to a range of gambling opportunities. New tools to assess the level of gambling participation and quality-of-life measures were used in a telephone survey with 7,010 adults in New Zealand. The findings show that people with higher gambling loss reported significantly poorer physical health, mental health, relationships, feelings about self, quality of life, satisfaction with life, living standards, and study performance. When respondents' reports of quality of life in the various domains were analysed in relation to the time spent gambling in different modes, it was clear that time spent on electronic gaming machines provided the greatest risk for people's quality of life. This study estimated that 2.4% of the population had an inferior state of reported mental well-being as a result of gambling. The main contribution came from the playing of electronic gaming machines.

Keywords: gambling, telephone surveys, quality of life, New Zealand

Introduction

Research on the impacts of gambling on individuals has shown impairment of physical and mental health; reduction in study performance and work efficiency; commitment of crime to support gambling; financial hardship via debts and asset/money losses; and psychological disturbance such as depression, guilt, anxiety, suicide attempts, and drug and alcohol addiction (Abbott, 2001a, 2001b; Australian Institute for Gambling Research, 2001; Barnes, Welte, Hoffman, & Dintcheff, 1999; Dickerson et al., 1996; National Gambling Impact Study Commission, 1999; Productivity Commission, 1999; Shaffer & Korn, 2002). Interpersonal problems between gamblers and their significant others include relationship breakdown, neglect of family, domestic violence, and negative impacts on the physical and mental health of family members (Dickson-Swift, James, & Kippen, 2005; Lorenz & Yaffee, 1988, 1989; Patford, 2007). The provision of health, counselling, and other gambling treatment services was recorded as a further financial cost imposed by gamblers on

society (Productivity Commission, 1999). In New Zealand, analyses of users of treatment services have provided information about the primary mode of gambling associated with problems, that is, electronic gaming machines (EGMs) (Ministry of Health, 2007).

Research on the impacts of gambling has also provided discussion on the potential beneficial effects of gambling for individuals, particularly in terms of social interaction. The mental health benefits include a sense of social connectedness and a rest from daily stresses. Furthermore, in addition to fun and excitement, gambling may also contribute coping strategies by enhancing memory, problem-solving ability, concentration, and hand-eye coordination (Shaffer & Korn, 2002). These beneficial aspects of gambling tend to be identified as gambling mode and/or venue specific. For example, in New Zealand, *housie* (i.e., bingo) is considered a safe social outlet for women, as well as a good fundraiser and form of social cohesion for Maori and Pacific community groups. Racing provides an important social focus in rural communities and casino facilities provide a venue for social interactions for new migrants (Department of Internal Affairs, 1995; Li & Chan, 2006).

New Zealand provides a number of gambling opportunities: it has six casinos and approximately 20,000 non-casino gaming machines (Department of Internal Affairs, 2009). There are also several racing and sports betting opportunities and lottery products. The 2006/07 survey on Gaming and Betting Activities (Health Sponsorship Council, 2007) found that over four fifths (83%) of New Zealanders had taken part in at least one gambling activity during the last 12 months. The majority of people had engaged with lottery products (67%), just under one fifth had bet on horse or dog races or on sports events (18%), and just under one fifth had played a gaming machine at a pub or club (18%). Fewer people had played gaming machines at one of the six casinos (8%), played housie (bingo) for money (3%), played table games at one of the six casinos (3%), or played text (2%) or Internet games (<1%) for money.

Within the New Zealand context, there has been limited research assessing the full range of social impacts of gambling. In part, this has been due to the lack of reliable and complete data available for this analysis (Australian Institute for Gambling Research, 2001). Although previous studies have provided important information about the prevalence and the extent of gambling behaviours, these studies gave only a few indications of the impacts of gambling. Other studies have provided information on impacts for problem gamblers only, not for the full range of gamblers. In an attempt to address this limitation, the current study was undertaken to collect some of the missing information necessary for the further understanding of the impact of gambling in New Zealand via a general population survey. The survey, by sampling from the general population, avoided the limitations of researching exclusively- clinical populations and provided data complementary to that provided about people in treatment for gambling problems.

Also, the measures utilised in this study to assess participation in gambling have been developed to avoid some of the methodological problems identified in the literature (Abbott & Volberg, 1999; Collins & Lapsley, 2003; Duvarci, Azmi, Coskunol, & Ersoy, 1997; Hayward & Colman, 2004; National Gambling Impact Study Commission, 1999). The data collected allowed analysis of different ways of defining gambling participation, did

not conflate subjective response to gambling with participation measures, and allowed disaggregation by mode and venue of gambling, as well as by the measure having the potential to add new modes and venues to the measurement instrument if they enter the gambling environment.

In terms of impacts, the current study focuses primarily on measures of intangible impacts, including a wide range of potential impacts (both negative and positive) within the same measurement frame. The current study also utilises some of the data from the survey in a preliminary analysis of the social costs by using two counterfactual scenarios.

Methodology

Sample size
The total sample size of the survey was 7,010 (2,915 males and 4,095 females), composed of (a) a general population sample of 4,650 respondents, (b) a Maori oversample of 533 respondents, (c) a Pacific oversample of 858 respondents, and (d) a Chinese/Korean oversample of 969 respondents. The survey population consisted of New Zealand residents living in permanent private households who were 15 to 80 years of age and had lived in New Zealand for at least 12 months. The mean age of the participants was 43.13 years ($SD = 16.32$).

Data collection
Data collection took place from May 2007 to November 2007 using a computer-assisted telephone interview (CATI) system. A stratified sample design was used to reflect the New Zealand population on the basis of geographic regions and level of urbanisation. The strata, when combined, covered the whole of New Zealand. The level of urbanisation was divided into a metropolitan area (Auckland urban area) and large cities such as Hamilton, Christchurch, and Wellington; and smaller main urban areas, large towns, small towns, and rural areas. The strata had been derived from local calling areas but were adjusted to match main urban areas where possible.

Telephone numbers were randomly generated. The use of randomly generated phone numbers has the advantage of including both published and unpublished phone numbers and therefore greater coverage of the sampling frame than does the use of non-randomly generated, listed telephone numbers. Telephone numbers were screened against the Yellow Pages (to remove business numbers). Phone numbers were distributed in proportion to the usually resident population aged 15 to 80 years with a landline telephone across 33 area strata.

Each number was called at least 10 times at different times and days of the week until contact was made. The final stage of sampling involved the random selection of one respondent from among those eligible in each household. The number of eligible people living in each household was established and listed so that the data collection software could select one respondent at random (no decimation took place and the data were weighted

appropriately prior to analysis to take account of interviews being conducted with one person per household).

The sampling for the Maori sample utilised the Maori electoral roll, and the sampling for the Pacific and Chinese/Korean samples included the use of a lexicon approach. This lexicon sample was essentially a list-based frame of electoral households where there were published telephone numbers and people with Pacific or Chinese/Korean-seeming names. A list of words that could trigger a possible Pacific or Chinese/Korean name was matched against all the names (not just surnames) on the electoral roll to look for households where there might be Pacific or Chinese/Korean people.

Survey instrument

The survey was developed from the existing survey instrument produced from the pilot qualitative study previously conducted by SHORE and Whariki (2006). This pilot study included three components: (a) a review of the available literature about methodologies and approaches used for measuring the social and economic impacts of gambling; (b) data collection with various stakeholders from the gambling industry and qualitative interviewing of people from different ethnic groups who participated in gambling, as well as with those affected by the gambling of others, to provide insights into the nature and range of gambling impacts within New Zealand; and (c) development and piloting of a quantitative data collection instrument to assess the social and economic impacts of gambling in New Zealand (SHORE and Whariki, 2006). The survey instrument was piloted thoroughly and found to be largely successful in its aims. The current study builds on the survey designed as part of this pilot project. The survey covers the following areas:

Participation in gambling.   We first ascertained whether respondents had gambled in the previous 12 months. This was established by asking respondents if they had gambled using nine specified (and mutually exclusive) modes/venues of gambling plus any additional types of gambling they participated in. These modes/venues were playing EGMs in a bar, playing EGMs in a club, playing EGMs in a casino, gambling at a casino's table games, playing poker or other card games for money, betting at a race track, betting at the TAB, playing housie for money, and gambling on the Internet for money.

For each mode/venue in which a respondent reported gambling, they were asked how often they gambled using that mode/venue in the last 12 months, how much time they would spend gambling on a typical occasion for that particular mode/venue, and the longest amount of time they had spent on any one occasion in the last 12 months.

Gambling losses.   Respondents were asked how much money they had lost in the past 12 months due to gambling ("Overall, how much do you think you have lost in the last 12 months? By this I mean your total net loss."). It was explained to respondents, where necessary, that this is the total amount they have lost after winnings have been taken into account.

Loss-to-income ratio.   A ratio of losses to personal income was calculated. Respondents who reported earning less than $1,000 a year were excluded from the analysis to avoid a high loss-to-income ratio resulting from low loss by a low income earner. This resulted in the exclusion of 462 people, the majority of whom were parenting or doing unpaid work at home (44.3%) or were students (36.4%). A small proportion of them were retired (10.8%) or unemployed (6.1%).

Quality of life.   Respondents rated themselves on a 5-point scale (from very poor to very good) on a number of domains of life, including physical health, mental well-being, relationships with family and friends, feelings about oneself, overall quality of life, financial situation, material standard of living, performance in study or employment-related training, performance at work, ability to take care of children, and ability to take care of the elderly. Each domain reported was measured with a single question, such as "In general, in the last 12 months would you say your physical health has been very good, good, adequate, poor, or very poor?" and "Thinking about your relationships with people that are close to you, in the last 12 months how would you rate your relationships with family and friends? (very good, good, adequate, poor, or very poor)" Respondents also rated themselves (from very dissatisfied to very satisfied) on how satisfied or dissatisfied they were with their lives in general ("Taking everything into account, how satisfied or dissatisfied would you have been with your life in general these days?").

Illegal activities.   Respondents were asked if they had engaged in theft, fraud, or any other illegal activity in the last 12 months.

Results

Weighting and income imputation
Before examining the impact of gambling on the domains of life, the data were weighted in three stages. The first stage was to correct for dwelling unit or household selection probabilities (i.e., individuals in a household with many people have a lower chance of being selected; thus, they were under-represented and were weighted more). The weight for each individual was obtained by the number of eligible people in a household divided by the average number of individuals per household. The second stage was to match the survey weights to New Zealand 2006 Census population distributions by using post-stratification for groups based on gender, age, and ethnicity. The final stage involved a standardisation to match the weighted sample size to the initial survey size.

About 17% of income information was missing from this survey. Therefore, income was imputed by a mathematical formula obtained from a linear regression model, which used demographic variables as predictors. These variables included age, gender, ethnicity, education, marriage status, and current occupational status. This imputation decreased the median income of the sample from $35,000 to $24,000, which brings it into alignment with the national median income reported in the 2006 census (i.e., $24,400). The majority (84%) of the respondents who did not give their personal income information were either non-gamblers or gamblers who reported no gambling loss. Further analysis of the data

revealed that the exclusion of the 17% missing-income respondents from the regression analysis did not alter the findings of the current study.

Response rate

The response rate for the current study was 62% for the general population sample, 74% for the Maori sample, 64% for the Pacific sample, and 62% for the Chinese/Korean sample.

The response rate was calculated as follows:

Response rate =

$$\frac{\text{number of eligible responding}}{\left(\begin{array}{c}\text{number of eligible}\\\text{responding}\end{array}\right) + \left(\begin{array}{c}\text{number of eligible}\\\text{non-responding}\end{array}\right) + \left(\begin{array}{c}\text{estmated number of eligibles}\\\text{from the unknowns}\end{array}\right)} \times 100$$

The response rate reflects that a proportion of the unknowns were likely to be eligible if contact had been made. As we were not able to make contact with all who were eligible, they were classified as non-respondents. An assumption is made that the proportion of eligibles from the list of unknowns is the same proportion as eligibles from the set of known eligibility.

$$\begin{bmatrix}\text{Estimated number}\\\text{of eligibles from the}\\\text{unknown}\end{bmatrix} =$$

$$\begin{bmatrix}\text{number}\\\text{of}\\\text{unknown}\end{bmatrix} \times \frac{\left(\begin{array}{c}\text{number of eligible}\\\text{responding}\end{array}\right) + \left(\begin{array}{c}\text{number of eligible}\\\text{non-responding}\end{array}\right)}{\left(\begin{array}{c}\text{number of eligible}\\\text{responding}\end{array}\right) + \left(\begin{array}{c}\text{number of eligible}\\\text{non-responding}\end{array}\right) + \left(\begin{array}{c}\text{number of}\\\text{ineligibles}\end{array}\right)}$$

For the general population sample, the estimated number of eligible dwellings from the no answers was based on a previous study in which Telecom identified the proportion of residential telephone numbers in this category. This proportion of the no answers was added to the gatekeeper refusals (eligibility unknown) and the proportion of eligibles from the unknowns was estimated using the formula given.

Impacts of gambling on domains of life

Multinomial logistic regression was used to assess the relationship between gambling and people's quality of life. The mathematical formula for this model is as follows:

$$\Pr(y_i = j) = \frac{\exp(X_i \beta_j)}{1 + \sum_{j=1}^{J} \exp(X_i \beta_j)}, \quad J = 1, 2, 3 \ldots..$$

Table 1

Impact of money lost (as a ratio of income) on domains of life

Domain of life	Log odds	Odds ratio	Standard error	*p*-Value
Physical health	−0.21	0.81	0.068	< .001
Mental well-being	−0.39	0.67	0.079	< .001
Relationships with family/friends	−0.45	0.63	0.072	< .001
Feelings about self	−0.30	0.74	0.060	< .001
Overall quality of life	−0.30	0.74	0.070	< .001
Overall satisfaction with life	−0.21	0.81	0.059	< .001
Financial situation	0.08	1.09	0.066	0.196
Material standard of living	−0.17	0.84	0.062	0.006
Work performance	−0.09	0.91	0.075	0.227
Study/training performance	−0.21	0.81	0.075	0.006
Care giving – children	0.06	1.06	0.117	0.617
Care giving – elderly	−0.25	0.78	0.165	0.127

where for the ith individual, y_i is the observed outcome and X_i is a vector of explanatory variables. The unknown parameters β_j are typically estimated by maximum likelihood.

Two measures of participation in gambling (i.e., independent variables) are reported in this analysis: first, the ratio of losses to income, and second, time spent gambling in different modes. These analyses controlled for the effects of the following demographic variables to isolate an independent impact of gambling: age, gender, ethnicity, marital status, educational qualification, occupational status, income (with log transformation), and prevalence of other heavy gamblers in one's life.

Loss-to-income ratio

Results of the logistic regression assessing the impact of loss-to-income ratio on the domains of life are shown in Table 1. In summary, respondents with higher loss-to-income ratio reported experiencing significantly poorer physical health, poorer mental well-being, worse relationships with family/friends, worse feelings about self, lower overall quality of life, lower satisfaction with life, and poorer study-related performance.

There was no association between loss-to-income ratio and self-rated financial situation, but there was a poorer standard of living reported. Further analysis of the data (by dividing participants into different gambling levels for loss-to-income ratio) revealed that there were differences found in the reports of actual income relative to respondents' ratings of their financial situation. Gamblers in the high gambling-loss group[1] who rated themselves as good or very good in terms of their financial situation had an average annual income of $38,000, which was much lower than the average annual income of people who rated themselves as good or very good but who reported low gambling losses ($65,900).

Time spent gambling in different modes

Results of the logistic regression assessing the impact of time spent gambling in different modes[2] on the domains of life are shown in Table 2. The time spent on each gambling mode was analysed separately because of the high correlation in time spent between different modes.

In summary, playing EGMs in any setting (bar, club, or casino) was associated with self-reported poorer physical health. Playing EGMs in both bars and casinos affected participants' perceptions of their mental well-being, relationships with family/friends, feelings about self, overall quality of life, and overall satisfaction with life. Playing EGMs in a bar was also associated with poorer child rearing; on the other hand, playing EGMs in a casino was associated with better self-rated material standard of living.

Other results specific to the gambling mode were that a longer time spent playing on casino tables was negatively associated with participants' perceptions of their physical health, mental well-being, and work performance and was marginally associated with overall quality of life.

Betting at the TAB gave a mixed picture, with worse self-reported mental well-being but a better self-rated financial situation. Playing poker at home or with friends also gave a mixed picture, with worse self-rated study/training performance but better overall quality of life.

In contrast with the case in other forms of gambling, some positive associations emerged between time spent at the race track and participants' self-ratings of their physical health, feelings about self, satisfaction with life, financial situation, and material standard of living. A closer examination of the profile of people engaged in different gambling modes revealed that people who spent more time betting at the race track, playing housie, or playing EGMs in a club were older (mean age = 45.8, 46.2, and 48.6 years, respectively) and they included a higher proportion of retired people (14.9%, 24.8%, and 22.9%) compared with other forms of gambling. However, among these three groups, those who bet on the race track had the highest average annual income ($49,400) compared with people who played EGMs in a club ($35,600) or played housie ($27,500). In fact, people who bet at the race track had a higher average annual income than did people who were engaged in other forms of gambling, with the only exception being people who gambled at casino table games whose average annual income was $63,300.[3] In other words, people who spent more time betting at the race track were people who were senior in age (with about 15% of them retired) yet had a higher income; thus, it is not hard to understand why they perceived their quality of life and financial situation at levels higher than other gamblers.

Playing housie (in community centres, clubs, or bars) was also associated with a better material standard of living.

Impacts of gambling on illegal activities

Approximately 1.3% of people admitted they had engaged in illegal activities (mainly stealing and fraud) during the last 12 months. Logistic regression was used to assess the

Table 2
Impact of gambling modes on domains of life (showing log odds)

Domain of life	Gambling mode							
	EGMs in bar	EGMs in club	EGMs in casino	Casino tables	Poker	Race track	TAB	Housie (Bingo)
Physical health	-0.14***	-0.12*	-0.14**	-0.13*	-0.01	0.08*	-0.06	0.01
Mental well-being	-0.30***	-0.09	-0.21***	-0.15*	-0.07	-0.01	-0.15***	-0.04
Relationships with family/friends	-0.18***	-0.02	-0.12*	-0.14	-0.01	0.00	-0.04	0.09
Feelings about self	-0.14***	-0.02	-0.10*	-0.03	0.01	0.09*	0.07	0.01
Overall quality of life	-0.14***	-0.09	-0.10*	-0.14+	0.08*	0.07	0.02	0.03
Overall satisfaction with life	-0.13**	-0.08	-0.20***	-0.02	-0.02	0.12**	0.03	0.02
Financial situation	-0.05	0.05	0.01	0.01	0.00	0.10**	0.13*	0.06
Material standard of living	0.00	0.10	0.10*	0.08	0.03	0.10**	0.08	0.12*
Work performance	-0.04	0.05	-0.05	-0.16*	0.00	0.06	0.08	0.09
Study/training performance	-0.02	-0.11	0.08	-0.03	-0.13**	-0.02	-0.01	0.11
Care giving – children	-0.15*	0.08	-0.08	-0.16	0.08	0.08	0.09	0.18
Care giving – elderly	0.02	0.06	0.14	0.08	0.18	0.18	0.16	-0.15

Note. EGMs = electronic gaming machines.
*** $p < .001$. ** $p < .01$. * $p < .05$. + $p < .06$.

impact of gambling on individuals' involvement in illegal activities. The results show that people who played EGMs in a bar or played poker/card games at their own or someone else's house were significantly more likely to be involved in illegal activities compared with people who had never gambled in the last 12 months ($p = .011$ and $.008$).

For those who were involved in illegal activities, 25% said they would not have committed such a crime if they had not been gambling in the last 12 months.

Estimating the social cost of gambling

The results from the current study were utilised in an econometric analysis of the social cost of gambling (for references to the methodology used here, see Anielski & Braaten, 2006; Collins & Lapsley, 2003; Single et al., 2003).

The relationship between the measure of the domain of life (y) and the individual's gambling status (z characterised by 1 if they gamble, 0 if they do not) is given by the following:

$$y = \alpha + \beta x + \gamma z + u$$

where x is (a vector of) the individual's other social characteristics; u is a random term that covers variables not included in x; and α, the vector β, and γ are (estimated) parameters. A person who gambles will have a value of y given by:

$$y = \alpha + \beta x + \gamma + u$$

and a person with the same characteristics who does not gamble will have a value of y (say y^*) given by:

$$y^* = \alpha + \beta x + u.$$

Therefore y^*-y, the change from being a gambler to not being one, is given by γ.

The counterfactual is equivalent to recalculating the value of each if they switch from being a gambler (or a particular type of gambler) (i.e., $z = 1$) to being a non-gambler (i.e., $z = 0$).

In the current study, two counterfactuals were considered and reported on: (a) No Gambling: this assumes that all gambling (in every mode) does not occur; the purpose of this counterfactual is to give a sense of the general significance of gambling; and (b) No EGMs: this assumes that there is no gambling on EGMs (whether they are in bars, casinos, or clubs) and there is no displacement to other gambling activities. The aim of the second counterfactual was to assess the contribution of one particular gambling mode to overall social costs. The mode used to illustrate the principle was chosen because both the literature and the current study suggested that EGMs are the most socially costly of all modes. This may seem to be

Table 3
Mental well-being by reported state

State of mental well-being	Actual situation	Counterfactual	
		No gambling	No EGMs
Very good	1,722,000	1,767,000	1,767,000
Good	1,112,000	1,089,000	1,085,000
Adequate	273,000	255,000	257,000
Poor	46,000	42,000	43,000
Very poor	8,200	7,300	7,500
Total	3,160,000	3,160,000	3,160,000
Net improvement		74,000	69,500

Note. EGMs = electronic gaming machines.

the most policy-realistic scenario, but it crucially assumes that no EGM gambler switches to another mode or to any other socially costly activity (e.g., heavy drinking).

In this study, two life domains were chosen to give an overall estimate of the size of gambling: (a) mental well-being and (b) satisfaction with life. For each domain, an econometric equation was estimated across the 7,010 individuals and used to predict the outcome for each survey respondent based on their demographic characteristics and their gambling behaviour. The equation is a *probit*, which predicts the probability of an individual being in each of the five categories (i.e., very good, good, adequate, poor, and very poor) associated with the domains of life. The equations are summarised elsewhere (SHORE and Whariki, 2006). The particular advantage of this econometric approach is that the predictions from the equations (which are needed for the counterfactuals) are best linear unbiased estimates, even if the individual parameters are not precisely estimated.

The econometric equation can be used to predict what individuals will report if they have different gambling behaviour consistent with each counterfactual (i.e., no gambling and no EGMs). Aggregating across all individuals (in the age range from 15 to 80 years) gives the proportions of the population in each category.

Mental well-being
The relevant population responses from the sample are given in the "actual situation" column of Table 3, with the estimated responses from the counterfactuals shown in the following two columns.

To summarise the myriad changes in the impact of gambling on the mental well-being of all those involved in gambling, we proposed measuring the change by the number of people who would upgrade their category (e.g., from "good" to "very good"). The summary indicator is measured net, so that a person who downgrades their mental well-being state is offset by a person who upgrades their state.

The general conclusion is that under each of the counterfactuals, there would be mental well-being gains. If there were no gambling at all, 74,000 (2.4%) of the population would expect to have a better state of mental well-being. Moreover, of those 74,000 whose mental well-being would benefit from stopping gambling altogether, 69,500 would benefit from stopping gambling on all forms of EGM (assuming they did not displace their gambling to another mode), including those who report being associated with others who gamble on the EGMs. This number represents 94% of the net number who would benefit if all gambling were stopped.

Satisfaction with life

The relevant population responses from the sample are given in the "actual situation" column of Table 4, with the estimated responses from the counterfactuals shown in the following two columns.

Table 4

Satisfaction with life by reported state

State of satisfaction with life	Actual situation	Counterfactual	
		No gambling	No EGMs
Very satisfied	1,245,000	1,240,000	1,259,000
Satisfied	1,666,000	1,676,000	1,658,000
Neither satisfied nor dissatisfied	174,000	172,000	171,000
Dissatisfied	52,000	51,000	51,000
Very dissatisfied	22,000	21,000	21,000
Total	3,160,000	3,160,000	3,160,000
Net improvement		1,000	22,000

Note. EGMs = electronic gaming machines.

The counterfactual outcomes for satisfaction with life are quite different from the mental well-being outcomes. The total net improvement is only 1,000. Although there are small reductions in the lowest three categories, there is also a reduction in the top (very satisfied) category with the increase in the satisfied category. Thus, some people who are currently very satisfied would be less satisfied if there were no gambling. For them, some gambling must add to their satisfaction with their life.

The No EGMs counterfactual shows that there would be a net 22,000 who would report a more satisfying life if there were no EGMs. By comparison with the No Gambling counterfactual, we may conclude that there would be a net 21,000 (i.e., 22,000 to 1,000) who would be less satisfied with life if all forms of gambling, other than EGMs, were prohibited.

Discussion

The present study is an attempt to broaden the current understanding of the impact of gambling by using a less conventional approach. For example, instead of using a problem gambling screen, other ways of examining the impact of heavier gambling were investigated, including first, the individual's loss of money as a proportion of income (excluding those who reported earning less than $1,000 a year), and second, the time spent in different modes of gambling. Furthermore, new measures of quality of life derived from extensive qualitative questionnaire work were used to measure the impact of gambling.

The loss-to-income ratio proved to be a sensitive measure in relation to the domains of life; this measure showed an association with poorer physical health, mental well-being, relationships with family/friends, feelings about self, quality of life, satisfaction with life, and study/training performance. These findings are in accordance with previous research that showed that gambling has a negative impact on people's physical health, emotional well-being (including the quality of relationships and feelings about self), and study performance (Abbott, 2001a, 2001b; Ministry of Health, 2004; SHORE and Whariki, 2006). Past research has shown that New Zealanders tend to under-estimate their gambling expenditures (Abbott & Volberg, 2000); thus, it is expected that if actual gambling loss data were obtained, even stronger associations would be found between gambling loss and people's domains of life.

The finding that the loss-to-income ratio did not show any association with participants' ratings of their financial situation but is associated with a poorer standard of living is somewhat counterintuitive. It may be that participants were less uncomfortable in rating their material standard of living but found it more intrusive to report and rate their financial situation. In other words, participants' own perception of their financial situation may be prone to denial and wishful thinking. Further analysis of the data (by dividing participants into different gambling levels in terms of loss-to-income ratio) revealed that there were indeed differences found in the reports of actual income relative to respondents' ratings of their financial situation. Among those who rated themselves as good or very good financially, people with higher gambling losses had the lowest actual income. This finding illustrates the complexity of measuring the impact of gambling on financial well-being, while appearing to support previous findings of a negative impact of heavier gambling.

Regarding participants' ability to take care of children and the elderly and their self-rated work performance, the loss-to-income ratio failed to have a significant impact. This finding contrasts with previous research (e.g., Abbott, 2001a, 2001b; Productivity Commission, 1999), including the qualitative research that formed the first phase of this study (SHORE and Whariki, 2006). It may be that other aspects of gambling (such as time spent in gambling) are more influential on participants' self-perception of their care-giving ability and their work efficiency. This area warrants further research.

When respondents' reports of quality of life in the various domains were analysed in relation to the time spent gambling in various modes and venues, there was a clear picture, supported

by previous findings (e.g., Abbott & Volberg, 2000; Ministry of Health, 2006), that time spent on EGMs (especially EGMs in bars) was a risk for people's quality of life and also for criminal behaviour. This association held true even after controlling for participants' age, gender, ethnicity, marital status, educational qualifications, occupational status, and income.

Time spent playing EGMs in various settings, however, had differing impacts on participants' domains of life. Although playing EGMs in bars was associated with poorer self-ratings regarding several life domains, playing EGMs in clubs showed only one negative association with a quality-of-life domain (namely, physical health). Furthermore, in contrast with playing EGMs in bars and clubs, which showed only negative associations with participants' domains of life, playing EGMs in a casino showed some positive associations with participants' self-ratings regarding their material standard of living. More research (ideally with a longitudinal design) would allow us to further understand these relationships.

Other results specific to the gambling mode were that time spent playing on casino table games was associated with a poorer quality of life in a number of domains and playing poker/card games was associated with criminal behaviour and worse self-rated study performance. The race track, in contrast, provided a picture of a better quality of life and financial situation, and playing housie was associated with a better self-reported material standard of living.

In summary, the evidence from the current study that time spent gambling disaggregated into different modes of gambling is very informative. Although playing EGMs in bars was the greatest risk for people's quality of life, some forms of gambling proved to have beneficial impacts on the gamblers.

In addition, this study has contributed to the measurement of the social costs of gambling in New Zealand. With a no gambling counterfactual scenario, analysis has suggested that as much as a net 2.4% of the population had an inferior state of reported mental well-being as a result of gambling. The main contribution came from those who played EGMs. Analysis suggests that for respondents classified as having severe mental health problems or disorders, between 4.3% and 7.6% of them may have been caused by gambling. The study also showed that many people were worse off, as measured by the satisfaction with life question, as a result of their gambling, especially those who were involved with EGMs. However, some people would lead less satisfactory lives if there were no opportunities for them to gamble.

Limitations

One limitation of the current study is the use of the CATI system in recruiting survey participants. A disadvantage of CATI is that it does not allow for access to people without a landline phone. Although New Zealand telephone coverage is high by international standards (an estimate from the 2004 Household Economic Survey [Statistics New Zealand,

2004) indicated that 93% of households in New Zealand had a landline telephone), telephone coverage is lower among particular population sub-groups such as low-income households (86%), Maori peoples (89%), and Pacific peoples (87%). As Maori and Pacific peoples are at-risk groups for gambling in New Zealand, this bias may result in some under-estimation of the impacts of gambling.

There is also the issue of under-representation of heavy gamblers who are unable to access a landline telephone. Results from a New Zealand survey found that the proportion of respondents that had gone into debt or borrowed to gamble was very similar for respondents with and without access to a landline: 2.65% for respondents with a landline and 2.74% for respondents who did not have a landline (Pacific Research & Development Services & SHORE/Whariki, 2004). A pilot study found that problem gambling gave the same prevalence estimates when administered in a postal or telephone interview (Rönnberg et al., 1999). However, in the 1999 National Prevalence Survey, pathological gambling prevalence rates were approximately three times higher for the respondents who could not be contacted by telephone and who completed the postal questionnaire than they were for respondents who completed the questionnaire by telephone (Abbott & Volberg, 2000). It is possible, therefore, that the relationships found with reduced quality of life may be stronger if more of the heavier gamblers were included in the analysis.

Another limitation of the current study is the use of self-reported gambling loss data. Past research has documented the inconsistencies in how survey respondents calculate gambling expenditure and the mismatch between self-reported expenditures and actual gambling revenue (Blaszczynski, Dumlao, & Lange, 1997; Volberg, Gerstein, Christiansen, & Baldridge, 2001; Williams & Wood, 2007; Wood & Williams, 2007). In the New Zealand context, this is likely to result in under-estimation of actual gambling losses (Abbott & Volberg, 2000). Therefore, the relationships found between loss-to-income ratio and reduced quality of life may be stronger if actual gambling loss data were used in the analysis.

Finally, it is recommended that future studies follow participants over time to gain additional information and to further understand the extent to which gambling has an impact on people's lives.

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[1]This group consists of people with a loss-to-income ratio in the top 20% of the sample.

[2]Internet gambling was not included in this analysis because the number of people in the sample that participated in Internet gambling was too low (0.6%, $n = 42$).

[3]The mean age of people who spent a longer time on casino table games was 39.2 years and only 8.5% of them were retired.