The influence of depression and other co-occurring conditions on treatment outcomes for problem gamblers: a cohort study

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ABSTRACT

Objective: To examine the influence of co-occurring conditions on gambling treatment outcomes.

Design, setting and participants: Prospective cohort study of problem gamblers. Participants were recruited from consecutive referrals to a gambling therapy service in 2008. Inclusion criteria were: (i) assessed as a problem gambler based on a screening interview including DSM-IV criteria for pathological gambling, and (ii) suitable for admission to a treatment program. Cognitive-behavioural therapy was based on graded exposure-to-gambling urge. One-to-one treatment was conducted with 1-hour sessions weekly for up to 12 weeks.

Main outcome measures: Problem gambling screening and co-occurring conditions including depression, anxiety and alcohol use.

Results: Of 127 problem gamblers, 69 were males (54%), mean age was 43.09 years, and 65 (51%) reported a duration of problem gambling greater than 5 years. Median time for participants' enrolment in the study was 8.9 months. Results from mixed effects logistic regression analysis indicated that individuals with higher depression levels had a greater likelihood (13% increase in odds [95% CI, 1%–25%]) of problem gambling during treatment and at follow-up.

Conclusion: Addressing depression may be associated with improved treatment outcomes in problem gambling; conversely, treatment of problem gambling improves affective instability. We therefore recommend a dual approach that treats both depression and problem gambling.

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Pathological gambling, from a mental health perspective, is defined by the *Diagnostic and statistical manual of mental disorders*, fourth edition (DSM-IV) as "persistent and recurrent maladaptive gambling behaviour that disrupts personal, family and vocational pursuits".[1] In recent years, the term "problem gambling" has been used to define harm related to gambling with a broader definition than pathological gambling. This definition has been the basis of the development of screening instruments such as the Canadian problem gambling index[2] and the Victorian Gambling Screen (VGS).[3] Pathological gambling has been identified as an addictive disorder with similarities in neurocognitive and physiological pathways to substance use disorders.[4,5] Estimates of the prevalence of problem gamblers in the Australian adult population average around 2% across the states and territories.[6]

Previous studies have demonstrated that rates of co-occurring conditions are consistently elevated among problem gamblers. The association between problem gambling and other mental health conditions, such as substance use, mood disorders and anxiety disorders, has been well established in both clinical and population samples.[7,8] Consistent with an addictions model, it has been proposed that gamblers with an anxiety disorder tend to engage in gambling activities to reduce arousal states, while individuals with depression seek to heighten arousal states.[9] High levels of impulsivity traits have also been shown to co-occur with problem gambling severity. This subgroup of problem gamblers can also exhibit other conditions including mood disorders and substance dependency.[9]

In recent years, the availability of gambling treatments and outcome research has increased. A range of treatment approaches exists in psychological, peer-support, self-guided, eclectic and, more recently, pharmacological domains. The influence of co-occurring conditions on gambling treatment outcomes has been investigated in some studies. For example, in a naturalistic sample of problem gamblers engaged in a range of interventions including Gamblers Anonymous, a 12-step program, it was found that participants with mood disorders were more likely to take longer to achieve abstinence from gambling.[10] In 2002, an open-label study found that clinically depressed patients had the same gambling treatment outcomes as non-depressed patients when treated with the antidepressant citalopram.[11]

Previous studies have shown beneficial effects of cognitive-behavioural therapy in treating problem gamblers from a diversity of populations.[12] In other mental health conditions such as depression, anxiety and panic disorder, cognitive-behavioural therapy has also proven to be an efficacious treatment.[13-15] Our study investigates whether co-occurring conditions reported in the literature — and other conditions, including sociodemographic characteristics, state and trait anxiety, depression, stress, alcohol use, and sensation-seeking traits — influence treatment outcomes for problem gamblers who engaged in a behavioural treatment program. This study is part of a larger study investigating treatment outcomes and predictors of drop-out with treatment-seeking problem gamblers.[16]

METHODS

Setting and participants

The participants in this study were 127 adults who, at baseline, presented to the Statewide Gambling Therapy Service (SGTS) in South Australia seeking treatment for their problem gambling.

Assessment and treatment

Patients are referred to the SGTS by the Gambling Helpline, other gambling help agencies, health professionals including general practitioners, or by self-referral. On first presentation to SGTS, patients are provided with a screening interview, which comprises a gambling-focused cognitive-behavioural assessment that includes DSM-IV criteria for identifying pathological gambling. Patients are also assessed for any co-occurring conditions, such as alcohol dependence, anxiety and depression. The primary treatment

1 Univariate mixed effects logistic regression analysis showing the association of screening time, demographics, duration of gambling problem and clinical measures with gambling outcome†

Variable	Wald χ^2	df	*P*	Advanced to initial model?‡
Time§	44.27	1	< 0.001	Yes
Time*2¶	29.49	1	< 0.001	Yes
Demographic				
Age (years)	1.07	1	0.301	No
Sex	3.16	1	0.076	Yes
Marital status	3.36	4	0.499	No
Highest education level	6.66	4	0.155	Yes
Employment	5.16	5	0.397	No
Living arrangement	6.17	6	0.405	No
Duration of gambling problem	7.82	4	0.098	Yes
Clinical measures				
DASS21				
Depression	32.37	1	< 0.001	Yes
Anxiety	25.48	1	< 0.001	Yes
Stress††	31.81	1	< 0.001	No
AUDIT	7.74	1	0.005	Yes
STAI	26.86	1	< 0.001	Yes
AISS				
Novelty	1.19	1	0.276	Yes
Intensity	5.02	1	0.025	Yes

AUDIT = Alcohol Use Disorders Identification Test. AISS = Arnett Inventory of Sensation Seeking. DASS21 = Depression Anxiety and Stress Scale (short version). STAI = State–Trait Anxiety Inventory. † Gambling outcome measured with Victorian Gambling Screen harm-to-self subscale. ‡ Advanced to initial model if $P < 0.25$ and/or clinically important. § Continuous covariate. ¶ Significant quadratic term for time. †† Collinear with depression subscale, therefore did not advance to initial model. ◆

modality is a form of behaviour therapy called exposure therapy.[17]

Design and procedure

Participants were recruited from consecutive referrals to the SGTS between March and September 2008. Baseline measures were collected at an initial screening assessment. Follow-up assessments were conducted by mailed self-report questionnaires at 1, 3, 6 and 12 months. The study was approved by the Flinders Clinical Human Research Ethics Committee.

Gambling outcome measure

The VGS harm-to-self subscale is a self-reported 15-item questionnaire measuring the extent to which gambling behaviour has impaired the client's life. Concurrent validity indicates that the scale correlates highly with the South Oaks Gambling Screen (SOGS) at 0.97 but extends the score range. A score of 21 or higher identified a participant as a problem gambler.[18] We used the VGS harm-to-self subscale because it was developed and validated in Australia and has a 1-month time frame for reporting, which enabled us to measure change during and after treatment. Participants completed the VGS at baseline screening and then at all follow-up assessments by mail.

Baseline variables

Baseline demographic variables were sex, age, marital status, highest education level, employment status, and living arrangements. Data for duration of gambling problem and type of gambling were also collected.

Measures of co-occurring conditions

To assess the influence of co-occurring conditions on treatment outcome as measured by the VGS, the following measures were conducted at baseline and at all follow-up assessments:

- Trait anxiety, using the State–Trait Anxiety Inventory Form Y, a 20-item self-report measure.[19]
- Sensation-seeking traits, using the Arnett Inventory of Sensation Seeking, a 20-item self-report questionnaire.[20]
- Depression, state anxiety and stress, using the short version of the Depression Anxiety and Stress Scale (DASS21), a 21-item self-report questionnaire.[21]
- Alcohol use disorders, using the Alcohol Use Disorders Identification Test: Self Report Version (AUDIT), a non-diagnostic 10-item questionnaire on which scores greater than 8 indicate hazardous alcohol use.[22]

Statistical methods

Mixed effects logistic regression models were used to assess the extent to which participant demographics and co-occurring conditions influenced treatment outcomes over time as determined by the VGS (non-problem gambling = 0; problem gambling = 1). For repeated data, mixed models are useful for modelling correlations at the intra-individual level and use all the available data on each subject and therefore do not require imputation methods.[23] Variable selection commenced with univariate analyses. Selection for model advancement was based on $P < 0.25$ from Wald χ^2 tests and all variables considered clinically important. This conservative approach was to allow the inclusion of potentially important variables that otherwise may be excluded with traditional values such as $P < 0.05$.[24]

An initial "full" model was created with variables significant at $P < 0.25$ and not collinear. Using backward manual elimination methods, variables with the least significant Wald χ^2 statistic were removed from the model. A comparison of log likelihood values between the fitted model and the full model were conducted for each variable removed using likelihood ratio tests. Also, Akaike and Bayesian information criteria were examined as both take into account the statistical goodness of fit and the number of independent variables in the model. The goal was to construct a model with the fewest number of variables without compromising an adequate fit of the data. To interpret effect sizes of variables in the final model, odds ratios and confidence intervals were calculated. All statistical analyses were conducted using Stata statistical software, version 11 (StataCorp, College Station, Tex, USA).

RESULTS

Participant enrolment and flow

Participants were recruited from 240 consecutive referrals to SGTS during the study recruitment period. Twenty-three participants (9.6%) were excluded due to their unstable mental state. Of 217 eligible participants, 127 (58.5%) people consented to participate. Reasons given for non-participation included: declined (50; 23%); unfamiliarity with research protocol (25; 11.5%); not known (11; 5.1%); limited English (3; 1.4%); and homeless (1; 0.5%). There was a significant difference in sex distribution between non-participants and participants: 67 female (59.3%) non-participants compared with 58 female (45.7%) study participants ($\chi^2 = 4.45$; df = 1; $P = 0.035$). However, there were no differences between the groups in age, primary form of gambling, and duration of gambling problem.

Median duration for participants' enrolment in the study was 8.9 months: 50% participated for 7.4–9.7 months (interquartile range, 2.3 months) and 25% participated for less than 7.4 months. Patterns of completed measures for points in time included 91 (71.7%) at 3 months or more and 80 (63.0%) at 6 months or more.

Baseline data

Participants had a mean age of 43.09 (± 12.65) years. Sixty-nine participants (54.0%) were men, 110 (86.6%) reported gaming machines as their primary form of gambling, and 65 (51.0%) had been problem gamblers for more than 5 years. Compared with previous normative scores in the general adult population,[21] baseline DASS21 means for the SGTS cohort where higher for the depression (10.79 ± 6.06 v 2.83 ± 3.87), anxiety (6.50 ± 5.42 v 1.88 ± 2.95) and stress scales (10.61 ± 5.80 v 4.73 ± 4.20), and were in the moderate severity range. The distributions of baseline scores across severity categories of the AUDIT were 20.5% (26) for abstainers, 48.8% (62) for low-risk alcohol users, 16.5% (21) for risky or harmful alcohol users, and 14.2% (18) for participants with likely alcohol dependence. Stratifying the VGS self-harm subscale with a cut-off at 21 found 96.9% (123) of participants were classified as problem gamblers at baseline.

Regression models

Mixed effects logistic regression modelling was conducted to assess the extent to which co-occurring conditions influenced problem gambling treatment outcomes over time. A summary of each variable commencing with univariate analyses through to a final model are provided in Box 1 and Box 2, respectively. Wald χ^2 tests were conducted in order to determine if each variable accounted for a significant portion of the variance in the model. The initial or full model comprised all variables that were significant at $P < 0.25$, along with variables that were clinically important (Box 1). Due to collinearity between DASS21 depression and stress subscales ($r = 0.83$), the depression scale advanced to the initial model based on clinical relevance established in the research literature.

The associations between the independent variables in the final equation and problem gambling measured with the VGS, while holding all other variables constant, are shown in Box 2. Depression (DASS21) remained statistically significant at the 5% level in the final model. The odds of participants experiencing problem gambling over non-problem gambling for each one-unit increase on the DASS21 depression subscale increased by 13% and could be as low as 1% or as high as 25% while holding all other variables constant. Alcohol use and trait anxiety were significant at the 10% level. The significant quadratic term for time (Time*2) indicated that, on average, participants experienced a decrease in the likelihood of problem gambling at a faster rate from baseline to about 3 to 6 months, after which there was a levelling-off effect.

2 Final mixed effects logistic regression model showing association of screening time and clinical measures with gambling outcome†

	Wald χ^2	*P*	OR (95% CI)
Time‡	–4.75	< 0.001	0.46 (0.33–0.63)
Time*2§	3.34	0.001	1.04 (1.02–1.07)
Clinical measures			
DASS21	2.14	0.032	1.13 (1.01–1.25)
STAI	1.78	0.075	1.05 (1.00–1.11)
AUDIT	1.65	0.099	1.06 (0.99–1.14)

AUDIT = Alcohol Use Disorders Identification Test. DASS21 = Depression Anxiety and Stress Scale (short version). STAI = State–Trait Anxiety Inventory. † Gambling outcome measured with Victorian Gambling Screen harm-to-self subscale. ‡ Continuous covariate. § Significant quadratic term for time. ◆

DISCUSSION

This study investigated the influence of co-occurring conditions on gambling treatment outcomes. The analysis showed that depression ($P = 0.032$), trait anxiety ($P = 0.075$), and alcohol use ($P = 0.099$) significantly contributed to a statistical model explaining the influence of co-occurring conditions on gambling treatment outcomes. Also, the model demonstrated that treatment outcomes for participants, on average, initially improved at a faster rate and then slowed down with a levelling-off effect.

Results from a larger study investigating gambling treatment outcomes for the same participants in this study showed a clinically reliable improvement in general psychological distress for 43 (53.1%) individuals with available follow-up data.[16] Participants who reported higher levels of depression symptoms throughout the present study had a greater likelihood of experiencing problem gambling during and after treatment. Previous studies investigating the influence of depression on gambling treatment outcomes have found, at least for some individuals, that there was no relationship between improvement in gambling and improvement in depression.[11] Similarly, patients with a major depressive disorder had the same gambling-related outcomes as non-depressed patients following pharmacological treatment for their problem gambling.[11]

Our findings may be explained, at least partly, by the measurement of depression on a continuous scale rather than a diagnostic system, which may have increased sensitivity to the varying degrees of severity in depression. Also, participants in this study were engaged in a psychological treatment requiring the completion of regular tasks in order to achieve therapeutic benefits. Some participants may have been more prone to poorer outcomes due to the debilitating effects of affective instability on engagement and completion of treatment tasks.

Although alcohol use and trait anxiety variables did not meet conventional levels of statistical significance at an individual level, they did contribute to the overall goodness-of-fit of the model. Controlling or adjusting for alcohol use and anxiety produced a more

unbiased estimate for the association of depression with gambling treatment outcome. Previous research has identified alcohol use and anxiety as co-occurring conditions with problem gambling. However, the role of these conditions in influencing gambling treatment outcomes is less clear.

Our study has some limitations. Due to participant attrition at follow-up time points, the precision of statistical estimates was limited. In an attempt to maximise all available information and reduce bias, we used mixed effects models. Also, the study used one measure for assessing gambling treatment outcomes at each follow-up time point. Further studies could include measures from a number of problem gambling-related domains in order to enhance the validity of results. Such measures should include specific gambling behaviours; for example, net expenditure each month on gambling and the frequency with which gambling takes place.[25] Numerous items on the VGS harm-to-self subscale address behavioural components of gambling activities; however, gambling severity is conceptualised on a continuum rather than at a discrete level.

Finally, the inferential scope of this study is limited to a relatively homogenous group of problem gamblers. The primary form of gambling for a majority of participants was electronic gaming machines, and all participants were from a single gambling treatment service. Further research would benefit from a wider representation of psychological treatments and gambling activities of varying intensity and skill levels, using a more rigorous study design, such as a randomised controlled trial.

The findings from this study will assist in gaining a better understanding of the nature and complexity of the patients accessing gambling treatment services. Although there is a range of gambling treatment specialists, community-based health clinicians, such as medical practitioners and nurses, are often in the front-line and are well placed to identify and offer early intervention to problem gamblers. Findings from this and other studies indicate the need for routine screening of problem gamblers for co-occurring conditions such as depression and anxiety disorders. Conversely, patients suspected of having a gambling problem when presenting with other mental health conditions should also be screened for a gambling disorder as part of their assessment. Identification of co-occurring conditions early in treatment will enable the tailoring of treatment modalities to better meet the needs of patients and therefore improve treatment retention and outcomes, and reduce relapse rates.

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COMPETING INTERESTS

None relevant to this article declared (ICMJE disclosure forms completed).

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