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Predictors of Treatment Outcome Among Asian Pathological Gamblers (PGs): Clinical, Behavioural, Demographic, and Treatment Process Factors

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Abstract Research on predictors of treatment outcome among pathological gamblers (PGs) is inconclusive and dominated by studies from Western countries. Using a prospective longitudinal design, the current study examined demographic, clinical, behavioural and treatment programme predictors of gambling frequency at 3, 6 and 12-months, among PGs treated at an addiction clinic in Singapore. Measures included the Hospital anxiety and depression scale, gambling symptom assessment scale (GSAS), personal wellbeing index (PWI), treatment perception questionnaire and gambling readiness to change scale. Treatment response in relation to changes in symptom severity, personal wellbeing and abstinence were also assessed. Abstinence rates were 38.6, 46.0 and 44.4 % at 3, 6 and 12-months respectively. Significant reductions in gambling frequency, GSAS, and improvement in PWI were reported between baseline and subsequent outcome assessments, with the greatest change occurring in the initial three months. No demographic, clinical, behavioural or treatment programme variable consistently predicted outcome at all three assessments, though treatment satisfaction was the most frequent significant predictor. However, being unemployed, having larger than average debts, poor treatment satisfaction and attending fewer sessions at the later stages of treatment were associated with significantly poorer outcomes, up to 1-year after initiating treatment. These findings

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show promise for the effectiveness of a CBT-based treatment approach for the treatment of predominantly Chinese PGs. Clinical implications and suggestions for future research are discussed. Taken together, the findings suggest early treatment satisfaction is paramount in improving short-term outcomes, with baseline gambling behaviour and treatment intensity playing a more significant role in the longer term.

Introduction

Gambling disorders are estimated to affect 0.2–5.3 % of the adult population worldwide (Hodgins et al. 2011). Pathological Gambling (PG) is a persistent maladaptive pattern of gambling behaviour defined by the presence of at least 5 of the 10 behavioural diagnostic criteria in DSM-IV within the past 12-months, including, preoccupation, tolerance, withdrawal, gambling to escape mood, failed attempts to cut-back or stop gambling, lying to conceal gambling, chasing losses, needing financial bail-outs, loss of a relationship/job/career because of gambling and committing illegal acts to finance gambling. Problem gambling is regarded as a less severe form of disordered gambling with fewer than 5 of the DSM-IV criteria for PG present. The popularity of gambling as an acceptable form of social activity or entertainment, particularly during festive periods among the Chinese is well recognised, with the earliest documented account reported to have been some 3,000 years ago in mainland China (Tang et al. 2007; Loo et al. 2008). It has also been suggested that they may be predisposed to seek both exciting sensations and the opportunity to attain wealth from gambling (Vong 2007). Prevalence estimates for problem gambling among the Chinese are generally higher than in non-Chinese populations, at 2.5–4 % (Loo et al. 2008), as are estimates on the prevalence of pathological gambling, ranging from 1.8 % in Macao to 2.9 % among Australian Chinese. Individuals of Chinese origin currently comprise 74 % of Singapore's population (Department of Statistics Singapore 2010). Mirroring the situation in other countries, technological advances such as telebetting and the proliferation of online gambling sites (albeit illegal in most jurisdictions), make gambling in Singapore more accessible and available than ever before. The latest estimate for the prevalence of pathological gambling is 1.4 % with a further 1.2 % estimated to be probable problem gamblers (National Council of Problem Gambling 2012).

Pathological gambling can have a detrimental impact on psychological, social, familial and occupational functioning. Among individuals with PG, medical disorders and increased healthcare costs have been reported (Morasco et al. 2006). In Singapore and Hong Kong, high rates of co-morbid psychiatric disorders and suicide risk have been reported (Tang et al. 2007; Winslow et al. 2010; Lee et al. 2011a; Shek et al. 2012). The devastating effects of PG extend well beyond the PGs themselves. Research from these two jurisdictions suggests spouses and other family members of PGs often experience increased psychological morbidity and stress (Lee et al. 2011b; Leung and Tsang 2011). Financial difficulties are common among PGs in Singapore. Where the borrowing of money from banks and other financial services is difficult, gamblers often turn to borrowing from illegal lenders e.g., loansharks. These typically entail higher interest rates which exacerbate financial problems, and the use of verbal/physical harassment to gamblers and their families when chasing repayment is not uncommon. Given the multitude of problems associated with PG, it is imperative to ensure that evidence-based treatments are available for the small but significant minority with disordered gambling and to understand what

factors determine optimal recovery from this debilitating disorder. To date, this literature has been dominated entirely by research findings from studies on Western populations.

Several studies have examined predictors of attrition (LeBlond et al. 2003; Milton et al. 2002; Raylu and Oei 2007). However, the findings from studies examining predictors of treatment outcome are mixed and often contradictory. Demographic characteristics such as being male (Crisp et al. 2001), being younger, having more gambling related problems, lower incomes and living alone have been associated with poorer outcomes (Jackson et al. 2000), though contradictory evidence exists (Grant et al. 2004; Dowling 2009). In terms of gambling behaviour characteristics, Dowling (2009) found that higher baseline gambling frequency, higher expenditure and the presence of gambling-related problems were predictors of poorer treatment outcomes, however again, contradictory evidence exists (Echeburúa et al. 2001). With regards to clinical predictors, preoccupation, psychiatric and substance abuse co-morbidity as well as gambling related urges, gambling related cognitions and readiness to change have each been reported (Echeburúa et al. 2001; Jackson et al. 2003; Hounslow et al. 2011; Raylu and Oei 2007), with conflicting evidence emerging from others studies (Toneatto et al. 2002; Stinchfield et al. 2005). Finally, aside from the actual therapeutic approach, Australian researchers have found therapeutic alliance and treatment satisfaction to be treatment variables that predict outcome (Smith et al. 2004; Dowling and Cosic 2011).

These inconsistent findings likely reflect the gamut of methodological approaches including how outcome is defined, predictors examined, assessment tools, heterogeneity of the sample and time-frame adopted etc. which make it difficult to draw any conclusions from the evidence base thus far. Establishing baseline characteristics that predict treatment outcome, means modifications to the programme can be made to optimise treatment response. To date there has been no examination of treatment outcome and its predictors among PGs in Asia. Treatment at the National Addictions Management Service (NAMS) comprises individual counselling (minimum 8 sessions), group therapy (structured and delivered over 8 sessions) followed by a recovery support group (unstructured). The core component is individual counselling, delivered using a manualised cognitive behaviour therapy (CBT) workbook, which provides a structure to the modules/topics covered in the sessions. These include understanding gambling addiction (including cost-benefit analysis), financial management, identifying triggers, identifying erroneous beliefs and cognitive restructuring, managing triggers and risk situations and relapse prevention. There is also a mindfulness component and a session on family issues and social support. All patients undergo this core treatment, however there are adjunct treatments available such as family therapy on a needs-driven basis. During the study period, treatment was provided by 14 counsellors who had undergone the same minimum training. Following the initial assessment whereby patients are assessed and diagnosed by a psychiatrist and see an addiction counsellor, patients are expected to attend at least one counselling session per month as well as evening group therapy sessions. Patients with co-morbid psychiatric disorders or requiring medication will be required to undergo reviews with a psychiatrist at regular intervals.

This paper describes a prospective treatment outcome study examining predictors of outcome at 3, 6 and 12-months. In line with the recommendations from the 2005 Banff, Alberta framework for reporting outcomes in problem gambling treatment research (Walker et al. 2006) the outcomes included frequency (days per month), gambling symptom severity and quality of life.

Aims and Hypotheses

The present study examined predictors of treatment outcome, with days gambling in the month prior to interview as the primary outcome measure. Based on the extant literature on predominantly western populations, we hypothesised that younger patients, those with greater problem gambling symptom severity and those with more intense gambling behaviour at baseline would achieve poorer outcomes. The paper also reports abstinence rates, changes in gambling severity and quality of life up to 1-year. Since the sample was largely homogenous (male, Chinese, and employed) the only demographic variables examined were age, education, marital status, employment status, psychiatric history, problem gambling duration, debt amount, and family history of problem gambling. The baseline clinical/behavioural predictors were; anxiety, depression, gambling symptom severity, readiness to change scores and gambling days, with treatment satisfaction and number of treatment sessions attended as the treatment programme predictors.

Method

Subjects

The study used a prospective longitudinal study design and was conducted at the NAMS outpatient clinic, at the Institute of Mental Health, Singapore. Participants were 80 consecutive intake cases recruited during their first or second visit for the treatment of gambling disorders between July 2009 and July 2010. Inclusion criteria were; primary diagnosis of pathological gambling (PG i.e., a DSM-IV-TR score of 5 or above), English speaking and educated to at least secondary level. Only adult patients (those aged 21 or above which is the legal age for most forms of gambling in Singapore) up to the age of 65 were included so that the sample was representative of the local clinical population and minimized the extent to which cognitive decline could compromise the reliability of self-report data. Patients on remand or having received treatment in the previous 6-months were excluded. We also restricted participation to patients intending on undergoing the full (1-year) treatment programme to minimize attrition rates and optimize the reliability of data. In total 110 patients were screened and found to be eligible, however 8 refused to participate and 22 failed to complete the baseline interview due to not returning for their next (second) appointment. There were no statistical differences in demographic characteristics, DSM-IV score, gambling symptom severity, frequency or debt amount between these patients and study participants. Eligible participants were initially informed about the study by their doctor or counselor and if interested, they met with a researcher for eligibility screening and if appropriate, consent taking. After informed consent was taken, the baseline interview was conducted in one of the consultation rooms at the clinic. The study was approved by the relevant Research Committee CRC Reference Number 247/2008 and the Ethics Committee (Domain Specific Review Board, National Healthcare Group, Singapore Reference Number A/09/2). All procedures were carried out in accordance with the standards of the Committee on Human Experimentation at the hospital and the Helsinki Declaration of 1975.

The baseline interview was usually conducted during the second visit to the clinic. This comprised a semi-structured interview assessing gambling history and current behaviour (time and money spent on gambling), current debt and current legal status. Standardised assessments included the Hospital anxiety and depression scale (HADS) (Zigmond and

Snaith 1983), the Severity of dependence scale (SDS) (Gossop et al. 1995), the Gambling symptom assessment scale (G-SAS) (Kim et al. 2009), the Gambling readiness to change scale (GRTC) (Neighbors et al. 2002) and the Personal well-being index (PWI) (Cummins et al. 2003) to assess quality of life. Treatment satisfaction was assessed by the Treatment perceptions questionnaire (TPQ) at each outcome assessment point. Of the 80 patients, 57 (71.3 %) were re-interviewed at 3-months, 50 (62.5 %) at 6-months and 45 (56.3 %) at 12-months. The subsequent outcome assessments examined changes in gambling behaviours, rates of abstinence and changes in gambling symptom severity and quality of life. Outcome assessments were conducted at the clinic following the same procedure as the baseline interview, within two weeks of the due date. If the patient had dropped out of treatment, or had no appointment scheduled within this period, assessments were conducted over the phone. If contact could not be established after three attempts, they were considered to be 'lost to attrition'.

Measures

Hospital Anxiety and Depression Scale (HADS)

The widely used HADS (Zigmond and Snaith 1983) has been established as a convenient self-rating instrument for anxiety and depression in patients with both somatic and mental problems. It is found to be a reliable instrument for detecting states of depression and anxiety in the setting of a hospital medical outpatient clinic. It comprises 7 questions each for anxiety and depression assessment. Each item is scored on a 4-point scale (0–3). Based on the result of Nord-Trøndelag Health Study in Norway (Zigmond and Snaith 1983), the anxiety and depression sub-scales were found to be internally consistent, with values of Cronbach's coefficient (α) being 0.80 and 0.76, respectively. [Scoring: 0–7 = Normal, 8–10 = Borderline abnormal, 11–21 = Abnormal]. The HADS assesses current anxiety and depression experienced during the past week.

Severity of Dependence Scale (SDS)

The SDS is a 5-item questionnaire that provides a score indicating the severity of dependence on a substance. Each of the five items is scored on a 4-point scale (0–3). The total score is obtained through the addition of the 5-item ratings with a higher score reflecting a higher of level of dependence. The test has good retest reliability is 0.89 and a Cronbach's coefficient (α) ranging from 0.81 and to 0.90 depending on the drug. The SDS assesses drug use severity in the past month.

Personal Well-Being (PWI)

The PWI is used as a measure of quality of life (QoL) and comprises 8 items. Items are rated on a 11-point Likert scale, from 'completely dissatisfied' (0) to 'completely satisfied' (10). The PWI was selected on the basis of its validity and reliability (Cummins et al. 2003), with reported Cronbach α being 0.80 within a predominantly Chinese population (Lau et al. 2005). Based on earlier Asian studies, a score of 65 or above was considered to be in the normal range. The PWI assesses current personal well-being (time frame not specified).

Gambling Symptom Assessment Scale (G-SAS)

The 12-item G-SAS scale was utilised to assess gambling symptom severity (e.g., gambling urges, gambling thoughts), in the past week, with each item rated from 0 to 4. The total score ranged from 0 to 48, with higher scores representing higher gambling severity. The G-SAS has been found to be a valid and reliable measure, with Cronbach $\alpha = 0.87$ (Kim et al. 2009).

Gambling Readiness to Change Scale (GRTC)

The GRTC is a 9-item Likert scale [from 'strongly disagree' (1) to 'strongly agree' (5)] with three items measuring each of three stages: pre-contemplation, contemplation, and action. Respondents indicate the extent to which they agree with the statement presented in each item. (Neighbors et al. 2002). A higher total score indicates a greater readiness to change. The scale is reported to have satisfactory reliability for the composite scale ($\alpha = 0.81$). The GRTC assesses current readiness to change (time frame not specified).

Treatment Perceptions Questionnaire (TPQ)

The TPQ is a 10-item questionnaire that also allows open-responses/feedback of treatment service satisfaction. A global score is obtained by summing the scores of all items. (Marsden et al. 1998). The scale is reported to have fair good internal reliability $\alpha = 0.83$ and fair test–retest reliability with Intraclass correlation coefficients (ICCs) ranging from 0.40–0.60. The TPQ was designed to be administered at the end of treatment. In the current study patients were required to report their treatment satisfaction for the intervening period.

Additional data collected included social demographics, addiction history, current substance use/gambling behaviour and psychiatric history. These were extracted from the routine intake assessment form completed by clinicians during the first visit.

Statistical Analysis

All statistical analyses were performed using SPSS version 18. Descriptive statistics were computed for the basic demographic and clinical variables. Mean and standard deviations (SDs) were calculated for continuous variables and frequencies and percentages for categorical variables. Normality of quantitative data was checked using the Kolmogorv–Smirnov 1-sample test. Differences between baseline and outcome assessments (at months 3, 6 and 12) were tested by paired t test and Wilcoxon signed-rank test for normal and non-normal continuous variable whenever appropriate. Rating scores measured over time (G-SAS, PWI) and Gambling days were subjected to repeated measures analysis of variance (ANOVA). Corrections for multiple comparisons were made using Bonferroni adjustment procedures. Assumptions of the repeated measures ANOVA including sphericity assumption were checked using Mauchly's test. Multiple linear regression analyses were used to identify significant predictors of gambling days in PGs. Level of significance was set at p value <0.05.

Results

Social Demographic Characteristics

The sample was predominantly male (92.5 %), Chinese (87.5 %), employed (78.8 %), and living with family members (92.5 %). Just over half (51.3 %) were educated beyond secondary level and married (51.3 %), with a mean age of 36.7($\pm$10.6) years (see Table 1 for further details on the demographic characteristics).

Gambling Behaviour and Gambling Symptom Severity

The mean age of onset of gambling was 22.1 ($\pm$8.1) years and mean age of problem gambling onset was 24.3 ($\pm$8.8) years. The most common problem gambling activities

Table 1 Social demographic and gambling characteristics

Variables	%/Mean ($\pm$SD)
Gender	
Male	74 (92.5 %)
Race	
Chinese	70 (87.5)
Malay	8 (10)
Others	2 (2.5)
Marital status	
Single	31(38.8)
Married	41(51.3)
Separated	2 (2.5)
Divorced	6 (7.5)
Education	
Up to secondary	39 (48.8 %)
$\geq$Secondary	41 (51.3)
Living status	
Alone	6 (7.5)
Spouse/children	29 (36.3)
Family of origin	42 (52.5)
Others (e.g., partner, relatives)	3 (3.8)
Employed	63 (78.8 %)
% Family history of PG	18 (22.5)
% Psychiatric history	11 (13.8)
Gambling behaviours	
Days gambling per month	14.6 (9.4)
Hours spent on a gambling day	7.0 (4.9)
% With debt due to gambling	71 (88.8 %)
Debt amount (S$)	Median = $25,000 ($400–$170,000)
Monthly bet amount	Median = $3,000 (range = $40–$500,000)

were soccer betting (47.5 %) and slot machines (21.2 %), followed by horse racing/casino (both 11.2 %) and lotteries (7.5 %). Only 1 gambler (1.2 %) reported high-risk trading as his main problem gambling activity. Whilst most patients (87.8 %) reported having gambling related debt, only 5 (6.3 %) had ever filed for bankruptcy. Patients reported gambling on average 15 days a month, averaging 7 hours on each gambling day. The mean score on GSAS was 27.3 (±10.7), indicative of moderate severity (with 38.8 % obtaining scores falling in the severe or extremely severe range) (Kim et al. 2009). Patients fulfilled on average 7.9 (±1.3) of the 10 DSM-IV PG symptoms.

History of Illicit Drug Use and Current Substance Use

There were no reports of illicit drug use, 2 participants (2.6 %) reported using prescribed sleeping tablets in the month before interview, 24 (30 %) reported consuming alcohol in the last month and this was reported to be only occasional use (range 1–16 times a month), except for one patient who drank daily. The mean total score on the SDS for alcohol was 1.2(±2.8) indicating low level of dependence (Gossop et al. 1995). More than one-third (38.8 %) were smokers, and smoked on average 15.3(±7.9) cigarettes a day.

Medical Co-morbidity

11(13.8 %) reported having a past or current psychiatric problem (mainly depression) and 31 (38.7 %) reported having ever had suicidal thoughts. 9 (11.2 %) had previously attempted suicide and 23 (28.8 %) reported thoughts of self-harm/suicide in the previous month. Only three patients had a co-morbid psychiatric disorder (i.e., two with dysthymia and one with alcohol use disorder), although 6 patients were taking prescribed medications (i.e., sleeping tablets (n = 3), anti-depressants (n = 2), and mood-stabilisers (n = 1)). At baseline, mean scores on the HADS anxiety and depression subscale were 10.1(±4.3) and 9.3(±4.6) respectively, indicating mild anxiety and depression, with only 8 (10 %) reporting severe depression and 10 (12.5 %) severe anxiety. Mean score on the PWI was 47.1 (±17.7), with only 16 (20.0 %) scoring in the healthy range, i.e., 65 or above, based upon Asian norms (Lau et al. 2005).

Differences Between Patients Who Completed and Failed to Complete the Outcome Assessments

As a preliminary measure and to detect any biases that may arise out of patients' participation in outcome assessments, we divided patients into three broad categories; those who did not successfully complete any outcome assessments, those who completed one to two and those who completed all three assessments. No significant differences were found in any baseline measure (i.e., G-SAS, PWI, gambling days, hours per session etc.), with the exception of GRTC score. ANOVA post hoc pairwise comparisons with Bonferroni correction indicated that participants completing some assessments had a higher motivation score than those competing no assessments (mean difference = −0.86, $p < 0.05$, 95 % CI = [0.17, 1.54]) and all assessments (mean difference = −0.68, $p < 0.05$, 95 % CI = [0.08, 1.27]) and age, since this group were also significantly younger than patients completing all assessments (mean = 7.5 years younger, 95 % CI = [0.68, 14.26]).

Changes in Clinical Measures Over the Course of One Year

At the 3-month interview, all of those reassessed were still in treatment (mean = 6.3, range = 2–16 sessions attended). At 6-months, 60 % of those reassesed were still in treatment (mean = 2.6 range = 1–14 sessions attended) and at 12-months 53.3 % of those reassessed were still in treatment (mean = 2.2, range = 1–20 sessions attended).

Abstinence was reported by 22 out of 57 patients (38.6 %) at 3-months, by 23 out of 50 (46.0 %) at 6-months and by 20 out of 45 (44.4 %) at 12-months. Among those completing all three outcome assessments (n = 44) abstinence rates were 35.7, 47.6 and 42.9 % at 3, 6, and 12-months respectively. However there were no significant differences in abstinence rates between those in and out of treatment at 6-months (with abstinence rates 46.2 and 50 % respectively) nor at 12-months (with abstinence rates 50.0 and 33.3 % respectively).

Repeated measures ANOVA indicated significant reductions in gambling frequency over time ($F(1.9, 77.8) = 31.7$, $p < 0.001$). Pairwise comparisons (on those completing all three outcome assessments) revealed that gambling days at baseline ($M = 13.9$, $SD = 8.5$) was significantly higher than gambling days at 3-months ($M = 5.6$), 6-months ($M = 3.4$) and 12-months ($M = 3.4$). Other pairwise comparisons were not statistically significant (see Fig. 1).

With regards to gambling symptom severity, repeated measures ANOVA indicated significant reductions ($F(2.4, 97.0) = 64.2$, $p < 0.001$). Pairwise comparisons revealed that GSAS score at baseline ($M = 29.2$) was significantly higher than GSAS score at 3-months ($M = 13.9$), 6-months ($M = 10.7$) and 12-months ($M = 7.7$). In addition, scores at 3-months differed significantly from scores at 12-months (see Fig. 1). Finally regarding Quality of Life, repeated measures ANOVA indicated significant increases in PWI score over time ($F(2.6, 106.7) = 19.5$, $p < 0.001$). Pairwise comparisons revealed that PWI score at baseline ($M = 46.7$) was significantly lower than PWI score at 3-months ($M = 56.9$), 6-months ($M = 59.0$) and 12-months ($M = 62.9$). Other pairwise comparisons were not statistically significant (see Fig. 2).
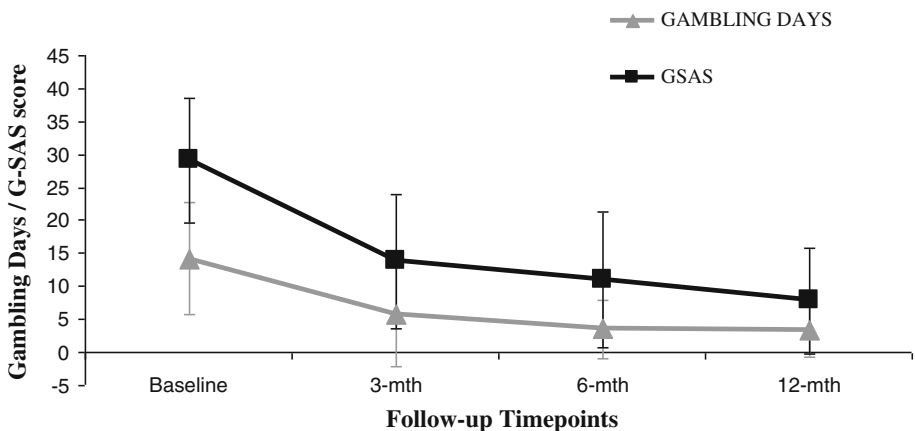
Fig. 1 Mean gambling days and symptom severity score at baseline, 3-, 6-, and 12-month time-points. *Error bars* represent 1 SD from the mean
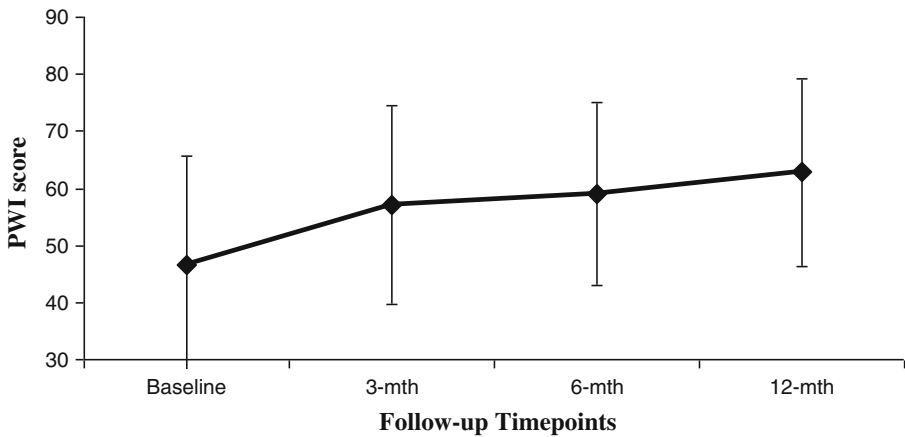
Fig. 2 Mean PWI scores at baseline, 3-, 6- and 12-month time-points. *Error bars* represent 1 SD from the mean

Modelling Predictors of Gambling Days

Demographic Predictors

Using backwards linear regression, age, education, marital status, employment status, psychiatric history, problem gambling duration, debt amount (above/below the sample median of \$25 K), and family history of problem gambling were entered into the model to explore predictors of gambling days at 3-months. The final model accounted for 9.6 % of the variance ($R^2 = 0.096$, $F(1, 51) = 5.4$, $p < 0.05$), and identified only employment status as a significant predictor ($B = -6.22$, $t = -2.32$, 95 %CI $= [-11.6, -0.85]$). For gambling days at 6-months however, the final model accounted for 18.3 % of the variance ($R^2 = 0.183$, $F(2, 43) = 4.83$, $p < 0.05$) and indicated that debt amount ($B = 4.37$, $t = 2.48$, 95 %CI $= [0.82, 7.93]$) and age ($B = -0.18$, $t = -2.42$, 95 %CI $= [-0.32, -0.04]$) were significant predictors. At 12-months the model accounted for 10.9 % of the variance ($R^2 = 0.109$, $F(1, 40) = 4.91$, $p < 0.05$), with debt as the only significant predictor ($B = 2.91$, $t = 2.22$, 95 %CI $= [0.26, 5.57]$, $p < 0.05$).

Clinical, Gambling Behaviour and Treatment Programme Predictors

Baseline HADS-anxiety score, HADS-depression score, GSAS, readiness to change score, gambling days, number of treatment sessions, and TPQ score were entered into a backwards linear regression to explore predictors of gambling days at 3-months. The overall model was significant and accounted for 12.9 % of the variance ($R^2 = 0.13$, $F(1, 55)$, $= 8.1$, $p < 0.01$), with TPQ as the only significant predictor in the final model ($B = -0.53$, $t = -2.9$, 95 %CI $= [-0.91, -0.16]$) $p < 0.01$). The same was observed with gambling days at 6-months where the final model accounted for 35.0 % of the variance ($R^2 = 0.35$, $F(2, 25) = 8.1$, $p < 0.01$) where TPQ ($B = -0.60$, $t = -2.8$, 95 %CI $= [-1.03, -0.17]$) and GRTC ($B = 3.20$, $t = 2.95$, 95 %CI $= [0.99, 5.42]$) were the only significant predictors. At 12-months the final model accounted for 29 % of the variance ($R^2 = 0.29$, $F(2, 23) = 4.7$, $p < 0.05$) and baseline gambling days ($B = 0.20$, $t = 2.4$,

95 %CI = [0.03, 0.37]) and total sessions attended between 6 and 12 months ($B = -0.18$, $t = -2.3$, 95 %CI = [−0.34, −0.02]) were significant predictors.

Discussion

The study set out to determine predictors of treatment outcome among Asian PGs undergoing outpatient treatment over a 12-month period. Our hypothesis was supported by the findings to an extent, though was limited to specific time-points. More than one-third reported achieving complete abstinence from all gambling activities within the first three months, as did almost half (46 %) of those reassessed at 6-months, and 44 % of those reassessed at 12-months. From the continuous data however, it appears that most treatment gain occurs in the initial three months, with only modest (non-significant) improvements in gambling behaviour (frequency), symptom severity or QoL beyond this period. Since the sample was reasonably homogenous in terms of demographics (age, employment status, race, gender etc.), the number of demographic predictors examined was limited relative to earlier research. Few patients had co-morbid psychiatric or substance use disorders which have been found to negatively impact on outcome in the general addiction literature, though to a lesser extent among PGs (Toneatto et al. 2002; Winters and Kushner 2003).

The data indicated that baseline employment status was the only significant demographic predictor of gambling frequency at 3-months, whereby those who were unemployed were likely to be gambling an additional 6.2 days in the month prior to the 3-month assessment. Employment rates were 78.8 % at baseline and among those completing outcome assessments 93.0 % at 3-months, 92 % at 6-months and 88.1 % at 12-months. Though notably high for an addiction population, there were no substantial changes in employment status over the course of treatment that is likely to have influenced outcome. At 6-months, baseline debt and age were significant predictors, whereby those with debts exceeding the median ($25 k) were gambling an additional 4.4 days and younger patients were gambling on an additional 1.8 days a month. Finally, at 12-months, those with higher than average debt, gambled an additional 3 days in the month prior to the 12-month assessment.

With regards to clinical, behavioural or treatment process measures, treatment satisfaction (TPQ score) emerged as the only significant predictor at 3-months and also at 6-months along with baseline motivation score. This translates to an additional gambling day at 3-months for every 2 point drop (lower) on the treatment satisfaction rating scale. At 6-months, the influence of TPQ was slightly stronger, however greater readiness to change also predicted a higher gambling frequency of nearly 3 days in the month prior to the six month assessment. This latter finding contradicts the literature that those expressing greater readiness to change are more likely to achieve better outcomes with respect to gambling behaviour (Petry 2005). This anomaly could be explained by differences in the measures used to assess stage of readiness to change. Finally, at 12-months, both baseline gambling frequency and total sessions attended between 6 and 12-months were significant predictors of gambling days. This suggests that for every additional 5 gambling days at baseline, patients will be gambling one additional day per month one year later, and that for every two additional treatment sessions attended between 6 and 12-months, gambling days at 1-year will be reduced by almost one day.

The results imply that just three months of integrated psychological interventions generated positive outcomes in terms of abstinence, reduced gambling symptom severity and frequency and improved quality of life. The clinical implications of the findings are

that additional support/interventions might be necessary for unemployed patients (where poorer outcomes might be expected). These patients have more time to engage in gambling activities and may chose to do so to alleviate boredom. Patients planning to return to work at a later stage may benefit from linking with organisations that focus on vocational skills training or other activities, or from engaging in self-help or other peer-support networks. Alternatively it may profit unemployed patients to undergo more intensive relapse prevention training during the early phase of treatment. Another implication is that since higher than average debt was a significant predictor of higher gambling frequency at both 6 and 12-months, financial debt recovery should form an integral component of the treatment programme. Given that 28 % of the sample reported thoughts of suicide or self-harm, clinicians should undertake routine screening and assessment of suicide risk and offer suicide prevention interventions for more vulnerable individuals.

Finally, since positive changes were achieved within the initial three months with high attrition beyond this point, implications for the local context, point towards a shorter, more condensed/intense treatment episode. Greater emphasis on rapport building and establishing trust prior to the delivery of psychological interventions could facilitate commitment to the treatment programme. Commitment to a full year of counselling may be optimistic in Singapore relative to other jurisdictions, given its predominantly Chinese culture. It has been suggested that Chinese Singaporeans may be reluctant to discuss their emotional problems with a professional for fear of 'losing face'—threatening one's self-esteem or bringing shame to a family (Kee 2004) and hence are less receptive to Western practices such as psychological therapies e.g., psychoanalysis, cognitive therapy which focuses on individualism rather than the collectivism of the East (Higgins et al. 2008).

Other cultural factors to be considered in the context of adopting traditionally Western approaches such as CBT for older, less-educated Singaporeans are belief systems, such as mental health problems being beyond their control, due to fate or supernatural causes (Yeo 2004). Among this group, the healthcare professional is more likely regarded an authoritarian, offering a directive, solution-focused approach, and thus non-judgemental, person-centred, non-directive approaches encouraging the patient to help themselves, may be perceived as ineffective and serve to discourage continued engagement in therapy. Since higher treatment satisfaction was associated with preferential outcomes, it is imperative that patient's expectations on the nature of treatment (e.g., patients' responsibility for behaviour change) and its expected impact (e.g., resolution of financial problems) are discussed, regularly monitored and managed. It has been noted that Chinese–Singaporeans may be inclined to express displeasure, disagreement or dissatisfaction indirectly, e.g., by failing to attend subsequent treatment sessions (Foo et al. 2006).

In an examination of counselling with Singaporean–Chinese, Foo et al. (2006) describes Singapore as a complex, metropolitan Asian state with features of collectivism, interdependence, familism, hierarchy, and holistic worldview, embracing a mix of Eastern and Westernized values, attitudes, and lifestyles. Though not specific to the treatment of PG, recommendations from the report are to minimise the number of counselling sessions in light of a preference for 'quick fixes' and 'value for money', to use Chinese metaphors, discuss religious issues or spirituality, allow alternative therapies to complement counselling, engage in intense rapport building sessions prior to therapy, and to use family therapy. However the report also acknowledges that the increasing proportion of more English-educated, Westernised Chinese–Singaporeans with a higher socio-economic status would likely prefer a non-directive approach.

These findings should be interpreted with the study limitations in mind. Patients were only assessed up to 1-year and therefore we were unable to determine if any factors

predicted abstinence (or other outcomes) after completing a full year of treatment. Another limitation was its reliance of self-report to obtain data on gambling behaviour. It was not possible to corroborate gambling outcomes using independent collateral reports since only 14 patients attended with a carer/family member where consent to participate in this manner could have been provided. Another further limitation is that the findings may not be representative of treatment seeking PGs with less than secondary education, female PGs or PGs in western countries which typically report higher psychiatric and substance use co-morbidity (Petry et al. 2005; Battersby et al. 2006; Toneatto et al. 2002; Welte et al. 2001). For example, of the treatment seeking PGs described in a recent Australian study by Hounslow et al. (2011), 37.5 % reported severe depression relative to only 10 % in the current study. Similarly 30.7 % reported either harmful or likely dependant alcohol use which was the case for only one participant in the current study where the mean problem gambling history was much longer (averaging 7 years longer) than the Australian study. Nonetheless, the findings of the current study have application to other Asian populations and contribute to a grossly limited evidence base concerning treatment outcomes among PGs of Chinese decent, where problem gambling rates are notably higher (Oei and Raylu 2010; Alegría et al. 2009) and up to three times that of Caucasians in Canada, US, Europe and Australia (Blaszczynski et al. 1998).

The findings of the current study broadly support those of Dowling (2009); Jackson et al. (2000); Jackson et al. (2003) and Stinchfield et al. (2005), that there are few demographic, or baseline psychosocial or gambling characteristics associated with outcome. Given the limited number of clinical or demographic predictors identified in the current and earlier studies, future studies may profit from examining a broader range of predictors including those assessing external influences on gambling behaviour such as social support and continued engagement in gambling networks. A larger sample with less attrition and collateral reports to validate self-reported outcomes would significantly enhance the reliability of the findings in any future research efforts. Finally, though treatment does confer benefits in terms of reduced addiction severity and improved quality of life, the finding that one-third of problem gamblers recover naturally without any formal treatment (Slutske 2006) must not be overlooked, since treatment-seekers represent only a small (albeit often more complex) minority of the disordered gambling population. Future research efforts should aim to identity the mechanisms underlying natural recovery and whether these can compliment formal treatment approaches to optimise recovery for this group of individuals. In summary, the study found that among a sample of predominantly Chinese pathological gamblers there were no consistent baseline predictors of treatment outcome. However, being unemployed, having large debts, poor treatment satisfaction and attending fewer sessions (at later stages of treatment) were associated with significantly poorer outcomes, up to 1-year after initiating treatment.

References

Alegría, A. A., Petry, N. M., Hasin, D. S., Liu, S. M., Grant, B. F., & Blanco, C. (2009). Disordered gambling among racial and ethnic groups in the US: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *CNS Spectrums, 14*(3), 132–142.

Battersby, M., Tolchard, B., Scurrah, M., & Thomas, L. (2006). Suicide ideation and behaviour in people with pathological gambling attending a treatment service. *International Journal of Mental Health and Addiction, 4*(3), 233–246.

Blaszczynski, A., Huynh, S., Dumlao, V. J., & Farrell, E. (1998). Problem gambling within a Chinese speaking community. *Journal of Gambling Studies, 14*(4), 359–380.

Crisp, B. R., Thomas, S. A., Jackson, A. C., & Thomason, N. (2001). The influence of demographic, behavioural and treatment characteristics on problem gambling counselling outcomes. *Australian Journal of Primary Health, 7*(2), 32–36.

Cummins, R. A., Eckersley, R., Pallant, J., Van Vugt, J., & Misajon, R. (2003). Developing a national index of subjective wellbeing: The Australian Unity Wellbeing Index. *Social Indicators Research, 64*, 159–190.

Department of Statistics Singapore. (2010). *Census of population 2010 statistical release 1: Demographic characteristics, education, language and religion.* Retrieved April 2, 2012, from http://www.singstat.gov.sg/pubn/popn/c2010sr1.html.

Dowling, N. (2009). Client characteristics associated with treatment attrition and outcome in female pathological gambling. *Addiction Research and Theory, 17*(2), 205–219.

Dowling, N., & Cosic, S. (2011). Client engagement characteristics associated with problem gambling treatment outcomes. *International Journal of Mental Health and Addiction, 9*(6), 656–671.

Echeburúa, E., Fernández-Montalvo, J., & Báez, C. (2001). Predictors of therapeutic failure in slot-machine pathological gamblers following behavioural treatment. *Behavioural and Cognitive Psychotherapy, 29*(3), 379–383.

Foo, K. H., Merrick, P. L., & Kazantzis, N. (2006). Counseling/psychotherapy with Chinese Singaporean clients. *Asian Journal of Counselling, 13*(2), 271–293.

Gossop, M., Darke, S., Griffiths, P., Hando, J., Powis, B., Hall, W., et al. (1995). The severity of dependence scale (SDS): Psychometric properties of the SDS in English and Australian samples of heroin, cocaine and amphetamine users. *Addiction, 90*(5), 607–614.

Grant, J. E., Kim, S. W., & Kuskowski, M. (2004). Retrospective review of treatment retention in pathological gambling. *Comprehensive Psychiatry, 45*(2), 83–87.

Higgins, L. T., Davey, G., Gao, X., & Ni, Z. J. (2008). Counselling in China: Past, present and future. *Psychology and Developing Societies, 20*(1), 99–109.

Hodgins, D. C., Stea, J. N., & Grant, J. E. (2011). Gambling disorders. *The Lancet, 378*(9806), 1874–1884.

Hounslow, V., Smith, D., Battersby, M., & Morefield, K. (2011). Predictors of problem gambling severity in treatment seeking gamblers. *International Journal of Mental Health and Addiction, 9*(6), 682–695.

Jackson, A., Thomas, S., & Blaszczynski, A. (2003). *Best practice in problem gambling services.* Melbourne: Gambling Research Panel.

Jackson, A., Thomas, S., Thomason, N., & Ho, W. (2000). *Longitudinal evaluation of the effectiveness of problem gambling counselling services, community education strategies and information products— vol 2: Evaluation of the effectiveness of the counselling interventions at breakeven problem gambling counselling services.* Melbourne: Victorian Department of Human Services. Retrieved April 2, 2012, from http://www.edfac.unimelb.edu.au/problemgambling/docs/Publications/pg_volume2.pdf.

Kee, C. H. Y. (2004). Cultural features as advantageous to therapy: A Singaporean perspective. *Journal of Systemic Therapies, 23*(4), 67–79.

Kim, S. W., Grant, J. E., Potenza, M. N., Blanco, C., & Hollander, E. (2009). The gambling symptom assessment scale (G-SAS): A reliability and validity study. *Psychiatry Research, 166*(1), 76–84.

Lau, A. L. D., Cummins, R. A., & McPherson, W. (2005). An investigation into the cross-cultural equivalence of the Personal Wellbeing Index. *Social Indicators Research, 72*, 403–430.

LeBlond, J., Ladouceur, R., & Blaszczynski, A. (2003). Which pathological gamblers will complete treatment? *British Journal of Clinical Psychology, 42*(2), 205–209.

Lee, K. M. T., Guo, S., Manning, V., Thane, K., & Wong, K. E. (2011a). Are the demographic and clinical features of pathological gamblers seeking treatment in Singapore changing? *Singapore Medical Journal, 52*(6), 428–431.

Lee, K. M. T., Manning, V., Teoh, H. C., Winslow, M., Lee, A., Subramaniam, M., et al. (2011b). Stress-coping morbidity among family members of addiction patients in Singapore. *Drug and Alcohol Review, 30*(4), 441–447.

Leung, C., & Tsang, S. (2011). The profiles of gamblers seeking counseling services: Evidence from Chinese gamblers in Hong Kong. *Asia Pacific Journal of Social Work and Development, 21*(2), 62–76.

Loo, J. M. Y., Raylu, N., & Oei, T. P. S. (2008). Gambling among the Chinese: A comprehensive review. *Clinical Psychology Review, 28*(7), 1152–1166.

Marsden, J., Bacchus, L., Stewart, D., Griffiths, P., Clarke, K., Gossop, M., et al. (1998). *The treatment perceptions questionnaire (TPQ): A brief questionnaire for assessing service satisfaction (unpublished manuscript).* London: National Addiction Centre.

Milton, S., Crino, R., Hunt, C., & Prosser, E. (2002). The effect of compliance-improving interventions on the cognitive-behavioural treatment of pathological gambling. *Journal of Gambling Studies, 18*(2), 207–229.

Morasco, B. J., Pietrzak, R. H., Blanco, C., Grant, B. F., Hasin, D., & Petry, N. M. (2006). Health problems and medical utilization associated with gambling disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Psychosomatic Medicine, 68*(6), 976–984.

National Council of Problem Gambling. (2012). Report of survey on participation in gambling activities among Singapore residents. Retrieved April 2, 2012, from http://www.knowtheline.sg/pdf/2011_NCPG_Gambling_Participation_Survey_23_Feb_2012.pdf.

Neighbors, C., Lostutter, T. W., Larimer, M. E., & Takushi, R. Y. (2002). Measuring gambling outcomes among college students. *Journal of Gambling Studies, 18*(4), 339–360.

Oei, T. P. S., & Raylu, N. (2010). Gambling behaviours and motivations: A cross-cultural study of Chinese and Caucasians in Australia. *International Journal of Social Psychiatry, 56*(1), 23–34.

Petry, N. M. (2005). Stages of change in treatment-seeking pathological gamblers. *Journal of Consulting and Clinical Psychology, 73*(2), 312–322.

Petry, N. M., Stinson, F. S., & Grant, B. F. (2005). Comorbidity of DSM-IV pathological gambling and other psychiatric disorders: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Journal of Clinical Psychiatry, 66*(5), 564–574.

Raylu, N., & Oei, T. (2007). Factors that predict treatment outcomes in a community treatment agency for problem gamblers. *International Journal of Mental Health and Addiction, 5*(2), 165–176.

Shek, D. T. L., Chan, E. M. L., & Wong, R. H. Y. (2012). Associations between pathological gambling and psychiatric comorbidity among help-seeking populations in Hong Kong. *The Scientific World Journal, 2012*, 1–15.

Slutske, W. (2006). Natural recovery and treatment-seeking in pathological gambling: Results of two US national surveys. *American Journal of Psychiatry, 163*, 297–302.

Smith, S., Thomas, S., & Jackson, A. (2004). An exploration of the therapeutic relationship and counselling outcomes in a problem gambling counselling service. *Journal of Social Work Practice, 18*(1), 99–112.

Stinchfield, R., Kushner, M. G., & Winters, K. C. (2005). Alcohol use and prior substance abuse treatment in relation to gambling problem severity and gambling treatment outcome. *Journal of Gambling Studies, 21*(3), 273–297.

Tang, C. S., Wu, A. M. S., & Tang, J. Y. C. (2007). Gender differences in characteristics of Chinese treatment-seeking problem gamblers. *Journal of Gambling Studies, 23*(2), 145–156.

Toneatto, T., Skinner, W., & Dragonetti, R. (2002). Patterns of substance use in treatment-seeking problem gamblers: Impact on treatment outcomes. *Journal of Clinical Psychology, 58*(7), 853–859.

Vong, F. (2007). The psychology of risk-taking in gambling among Chinese visitors to Macau. *International Gambling Studies, 7*(1), 29–42.

Walker, M., Toneatto, T., Potenza, M. N., Petry, N., Ladouceur, R., Hodgins, D. C., et al. (2006). A framework for reporting outcomes in problem gambling treatment research: The Banff Alberta Consensus. *Addiction, 101*(4), 504–511.

Welte, J., Barnes, G., Wieczorek, W., Tidwell, M. C., & Parker, J. (2001). Alcohol and gambling pathology among US adults: Prevalence, demographic patterns and comorbidity. *Journal of Studies on Alcohol, 62*(5), 706–712.

Winslow, M., Subramaniam, M., Qiu, S., & Lee, A. (2010). Socio-demographic profile and psychiatric comorbidity of subjects with pathological gambling. *Annals of the Academy of Medicine, 39*(2), 122–128.

Winters, K. C., & Kushner, M. G. (2003). Treatment issues pertaining to pathological gamblers with a comorbid disorder. *Journal of Gambling Studies, 19*(3), 261–277.

Yeo, C. (2004). Mind your mind: A preventive programme for the control of major mental disorders in Singapore. In S. Saxena & P. J. Garrison (Eds.), *Mental health promotion: Case studies from countries* (pp. 73–75). Geneva, Switzerland: World Health Organization.

Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica, 67*(6), 361–370.