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Predictors of Problem Gambling Severity in Treatment Seeking Gamblers

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Abstract Problem gambling has become a widespread problem following the rapid expansion of electronic gaming machines into hotels and clubs over the last 10 years. Recent literature indicates that certain factors can influence problem gambling severity, such as psychiatric co-morbidity and personality traits, gambling related cognitions, substance use and gender. This study investigated 127 treatment seeking problem gamblers at baseline, who completed a range of self report measures including gambling severity. Using block-wise multiple regression modelling we found gambling related urge, gambling related cognitions, and depression were significant predictors of problem gambling severity. High levels of anxiety and stress were also found amongst this sample. These results have implications for health practitioners in assessment and treatment planning for problem gamblers and will possibly contribute to further development of gambling related measures.

Keywords Problem gambling · Gambling severity · Predictors · Treatment

Pathological gambling has been classified by the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) as an Impulse Control Disorder, along with other compulsive disorders such as compulsive shopping, sex and kleptomania (American Psychiatric Association 2000). It is classified by characteristics such as repeated attempts to give up, chasing losses, lying and deceit, and gambling with more money than one can afford. It has been estimated that approximately 2% of the Australian population (Delfabbro 2008) and 22,000 people in South Australia have gambling problems (Banks 2002). Prevalence rates

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in other countries have ranged from approximately 0.5% to 2% or more, for example Germany, Holland, Spain (Becona 1996), USA and Canada (Shaffer and Hall 2001), Britain (Wardle et al. 2007), Switzerland (Bondolfi et al. 2000), and Hong Kong (Wong and Ernest 2003).

In recent years the term 'problem gambling' has been used to define harm related to gambling (national definition) 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 (CGPI) (Ferris and Wynne 2001) and the Victorian Gambling Screen (VGS) (Ben-Tovim et al. 2001). In this paper we use the term problem gambling in order to encompass a broader range of individual experiences relating to the negative impact of gambling.

Of the number of problem gamblers that exist, few seek treatment. Within South Australia, it is roughly 10% (Delfabbro 2008). Two recent studies into motivators for change (Evans and Delfabbro 2005; Pulford et al. 2009) found that the main reason for pathological gamblers seeking assistance for their problem was primarily financial concern, loss or hardship, and psychological distress or physical health issues. Further, there are issues regarding shame, denial and stigma around problem gambling (Evans and Delfabbro 2005) and negative public attitudes towards gambling (Orford et al. 2009). Relationship issues are of concern but have not been established as a primary motivator to seek treatment (Pulford et al. 2009).

Individual problem gamblers differ in their severity levels of gambling related symptoms. It has been found that within Australia and internationally, several factors have shown correlation with problem gambling severity. These include male gender (Ladd and Petry 2002b; Namrata and Oei 2009), personality traits such as impulsivity (Blaszczynski et al. 1997b; Vitaro et al. 1997), personality disorders (Blaszczynski et al. 1989; Blaszczynski and Nower 2002; Pietrzak and Petry 2005), cognitions (Joukhador et al. 2003; Toneatto et al. 1997) and substance use (Bondolfi, et al. 2000; Gerdner and Svensson 2003; Griffiths et al. 2010; Ibanez et al. 2001; Kausch 2003; Ladd and Petry 2002a). Given the seriousness of problem gambling, it is important to examine possible clinical and demographic factors that are related to problem gambling severity among treatment seeking gamblers. The identification of specific factors linked to gambling severity would enhance the effectiveness of screening processes and subsequent treatment planning by clinicians.

Identifying demographic and clinical factors that may be associated with problem gambling severity will also inform future investigations into whether these factors have an impact on treatment attrition rates and whether certain treatments are inappropriate. For example, if highly impulsive treatment seeking gamblers present to a cognitive behavioural therapy (CBT) treatment program that employs cognitive therapy or cue exposure and response prevention techniques, difficulties could arise in terms of adherence to treatment tasks. Such clients may well drop out in frustration with the treatment process. In addition, examining predictors of severity is useful in terms of best promoting treatment facilities for problem gambling. If, for example, it is found that gender and gambling severity levels are related then gambling treatment advertising campaigns need to be tailored to ensure that they capture the right audience.

The main objective of this cross sectional study was to examine whether certain clinical and demographic variables such as alcohol use, gender, depression, gambling urge, cognitions and sensation seeking traits are predictive of severity in gambling related symptoms amongst treatment seeking problem gamblers in South Australia at baseline.

Methods

Service and Participants

The participants in this study were adults (n=127) who presented to the Statewide Gambling Therapy Service (SGTS) in South Australia, seeking treatment for their problem gambling. The outpatient SGTS program was inaugurated in 2007, based on the intensive statewide service that had been developed over 10 years previous. The service offers one-on-one therapy for problem gamblers in key metropolitan and rural regions that are associated with significant problem gambling activity. The service is staffed by a psychiatrist and multidisciplinary therapists with relevant mental health backgrounds. All therapists have post graduate qualifications in cognitive behaviour therapy (Battersby et al. 2008).

Assessment and Treatment

On first presentation to SGTS clients undergo a screening interview to assess suitably for admission into the treatment program. The interview is comprised of a gambling focused cognitive behavioural assessment which assesses the current severity of the problem and DSM IV criteria for identifying problem gambling. Clients are also assessed for any co-morbid mental health problems such as alcohol dependence, anxiety and depression.

Treatment used at the service is Cognitive Behavioural Therapy, and within this, the main approach used is graded cue exposure with response prevention. This treatment specifically targets the urge to gamble, which is often out of control in problem gamblers, and assists them to gradually confront these urges whilst preventing a response (Oakes et al. 2008). Clients eventually extinguish the urge to gamble through undertaking a hierarchy of graded exposure tasks, often starting with a visual cue of a picture of an electronic gaming machine, or an audio cue of sounds of a gaming machine, working towards eventually re-entering a venue and habituating to the urge to the gamble. On average, clients are seen on a weekly basis for approximately 5 to 12 weeks.

Design and Procedure

Participants were recruited from consecutive referrals to SGTS in the time period March to September 2008 as part of a larger cohort study investigating treatment outcomes (Smith et al. 2010). To be eligible, clients had to have been assessed as treatment seeking problem gamblers at screening interview and suitable for admission into the treatment program. Baseline measures were collected following the screening interview and consenting to participate in the study. The study was approved by the Flinders Clinical Research Ethics Committee.

Outcome Measure

Victorian Gambling Screen (VGS) The VGS is a self reported questionnaire measuring the extent to which gambling behaviour has impaired the client's life. It comprises three sub-scales (enjoyment of gambling, harm to partner and harm to self) with a total of 21 items. For the purposes of this study, only the harm to self sub-scale was used as an outcome measure. This sub-scale consists of 15 items including questions such as "Has gambling been more important to you than anything else you might do?" and "How often have you lied to others to conceal the extent of your involvement in gambling".

The VGS harm to self sub-scale has been validated for use in Australia. Concurrent validity indicates the scale correlates highly with the South Oaks Gambling Screen (SOGS) at 0.97 but extends the score range. A cut-off score of 21 or higher identified a participant as a problem gambler (Ben-Tovim et al. 2001). A recent study confirmed the harm to self subscale as a reliable and valid screening tool of gambling severity in treatment seeking problem gamblers. Robust internal validity was found with a Cronbach's alpha of 0.89. It also had greater reliability in identifying severity of problem gambling compared to the SOGS (Tolchard and Battersby 2010). It was also chosen as the outcome measure because it was developed and validated in Australia and it has a 1 month time frame for reporting.

Predictors

Demographic variables included gender, age, marital status, highest education level, and employment status. Data for duration of gambling problem and type of gambling was also collected. Clinical variables included self reported negative affectivity, trait anxiety, gambling urge, cognitions, alcohol use, sensation seeking traits, perceived social support, and functional ability.

General Psychological Distress The Depression Anxiety and Stress Scale (DASS21) is a 21 item self-report questionnaire that measures the experience of depression, anxiety (state) and stress. The participant rates the degree to which statements such as "I couldn't seem to experience any positive feeling at all" and "I felt scared without any good reason" apply to them. Normal data has been collected for Australian populations and the DASS has been validated against other Depression and Anxiety Inventories (Lovibond and Lovibond 1995).

Trait Anxiety The Trait Anxiety Inventory form Y-20 is a 20 item self report measure designed to record level of trait anxiety. Items include statements such as "I feel nervous and restless" and "I worry too much over something that really doesn't matter". Studies have shown the scale has good reliability measured by test-retest coefficients and sound validity (Spielberger et al. 1983).

Urge The Gambling Urge Scale (GUS) is a self-report questionnaire measuring the extent of gambling urge. The scale consists of six items, including statements such as "I crave a gamble right now" and "All I want to do is gamble". Research into concurrent, predictive and criterion-related validity of the GUS suggest it is a valid and reliable instrument for assessing gambling urges among non-clinical gamblers. (Raylu and Oei 2004b).

Cognitions The Gambling Related Cognition Scale (GRCS) is a 23 item self report questionnaire that records common thoughts associated with problem gambling. Items include statements such as "Losses when gambling, are bound to be followed by a series of wins" and "Relating my winnings to my skill and ability makes me continue gambling". A comparison with the South Oakes Gambling screen indicated the scale has good psycho-metric properties in measuring gambling cognitions in a non-clinical sample (Raylu and Oei 2004a).

Alcohol Use The Alcohol Use Disorders Identification Test (AUDIT) Self Report Version is a non-diagnostic ten item questionnaire indicating hazardous alcohol use. Questions measure quantity and frequency of alcohol use, possible dependence on alcohol, and alcohol-related problems. According to a recent review of studies reporting the psycho-

metric properties of the AUDIT, the scale reveals specifics and sensitivities superior, to those of other self-report screening measures and good test-retest reliability and internal consistency (Reinert and Allen 2002).

Sensation Seeking Traits The Arnett Inventory of Sensation Seeking is a 20 item self report questionnaire that measures sensation seeking personality trait. Participants are asked for their responses to 20 statements, for example "I would never like to gamble with money, even if I could afford it" and "I like the feeling of standing next to the edge on a high place and looking down". The scale has been shown to be free from social desirability bias (Roth 2003).

Social Support The Multidimensional Scale of Perceived Social Support (MSPSS) is a 12 item self report questionnaire containing three sub-scales (significant other, family and friends sub-scales). Participants rate their responses to statements such as "My family really tries to help me" and "There is a special person in my life who cares about my feelings". Research has shown the MSPSS has good reliability, factorial validity and adequate construct validity (Zimet et al. 1988).

Functional Ability The Work and Social Adjustment Scale is a self-report questionnaire used to measure patient's perspective of their functional ability/ impairment. The scale contains five items that explore functional ability in the following areas: work, home management, social leisure, private leisure and family and relationships. Research into the validity of the scale suggests that WSAS correlates closely with the severity of depression and obsessive-compulsive disorder symptoms at 0.76 and 0.61 and is sensitive to patient differences and change following treatment (Mundt et al. 2002).

Analysis

All statistical analyses were conducted using Stata 11.0 (StataCorp 2009). To examine the predictors of problem gambling severity a block-wise multiple regression analysis was performed, with scores on the self-harm Victorian Gambling Screen subscale as the dependent variable and all variables with a significant correlation at the 0.05 level as independent variables. The blocks were entered cumulatively in a pre-specified sequence based on research relevance. In block 1, the variables relating to general psychological characteristics and disturbance were entered. Block 2 comprised of social and work impairment/support variables, block 3 entered gambling related cognitions and urges, and block 4 the demographic variables. Alternative models were compared using the percent of error explained by the coefficient of determination (R^2). Wald tests were used to determine significant predictors at the 5% level. In cases of potential model misspecification robust standard errors were calculated to account for any violations of distributional assumptions.

Results

Participant Enrolment

Participants were recruited from 240 consecutive referrals to SGTS during the study recruitment period. Due to an unstable mental state 23 (9.6%) persons met exclusion criteria. Reasons for non participation by eligible persons (n=217) included 50 (23%) declining to participate; 25

(11.5%) due to staff unfamiliar with research protocol; 11(5.1%) classified as unknown; 3 (1.4%) due to limited English; and 1 (0.5%) as homeless. The final study cohort comprised of 127 (58.5%) persons consenting to participate. There was a significant difference in gender distribution on participation status with 67 female (59.3%) non-participants compared to 58 female (45.7%) study participants (χ^2=4.45, *df*= 1, *p*=0.035), but no differences between the groups in age, primary form of gambling, and duration of gambling problem

Sample Characteristics

When compared to problem gamblers participating in a recent population based cross-sectional study conducted in South Australia (Gill et al. 2006) there were no significant differences in frequencies of age groups, gender, and education level. For marital status there was a borderline difference at the 5% level between the two groups (χ^2=7.96, *df*= 3, *p*=0.047) with the SGTS cohort having a greater number of separated/divorced participants. For employment status there was also a significant difference (χ^2=23.48, *df*= 3, *p*<0.001) with more participants reporting unemployment.

Demographic and clinical characteristics of the study cohort are presented in Table 1. When compared to previous normal population scores DASS-21 means where higher for the depression, anxiety, and stress scales, and in the moderate severity range. The distribution of scores across severity ranges for the depression subscale was 18.9% (*n*=24) in the normal range, 7.1% (*n*=9) in the mild range, 20.5% (*n*=26) in the moderate range, 16.5% (*n*=21) in the severe range, and 37% (*n*=47) were in the extremely severe range. Anxiety scores were distributed as 37% (*n*=47) in the normal range, 3.2% (*n*=4) in the mild range, 20.5% (*n*=26) in the moderate range, 16.5% (*n*=21) in the severe range, and 22.8% (*n*=29) were in the extremely severe range. Stress scores were distributed as 33.1% (*n*=42) in the normal range, 11% (*n*=14) in the mild range, 22.1% (*n*=28) in the moderate range, 13.4% (*n*=17) in the severe range, and 20.5% (*n*=26) were in the extremely severe range.

Mean scores on the TAI were higher than previous normative data in working adults, college and high school students (Spielberger et al. 1983) by at least one standard deviation. The distribution of scores across severity categories of the AUDIT were 20.5% (*n*=26) for abstainers, 48.8% (*n*=62) low risk alcohol use, 16.5% (*n*=21) risky or harmful alcohol use, and 14.2% (*n*=18) with likely alcohol dependence. Stratifying the VGS self- harm subscale with a cut-off at 21 (Ben-Tovim et al. 2001) found 96.9% (*n*=123) of participants were classified as problem gambling at assessment.

Block-Wise Regression Analysis

To examine the predictors of gambling severity as measured by the Victorian Gambling Screen a block-wise regression analysis was conducted. Table 2 presents results for correlation analyses between VGS and candidate predictor variables. The final linear regression model comprised of all variables significant at the 0.05 level. In block 1, 27.5% of the variance in gambling severity could be explained by state and trait anxiety, depression, and stress (see Table 3). The social and work functioning/impairment and perceived social support variables in block 2 significantly contributed to the model, explaining an additional 5.7%. A further 12.1% was explained by the gambling urge and cognition variables in block 3. Block 4, comprising of the demographic variable age was insignificant in contributing to the model. The final model was statistically significant, *F* (9, 117)=13.03 (p<0.001) and could explain 46% of variance in gambling severity as measured by the VGS.

Table 1 Demographic and clinical characteristics of 127 problem gamblers

Variable	Value
Age, mean ± SD, years	43.09±12.65
Male sex, number (percentage)	69 (54)
Marital status	
Married/defacto	57 (45)
Single	43 (34)
Separated	23 (18)
Widowed	4 (3)
Highest education level	
Primary school	1 (1)
High school	73 (58)
TAFE/Trade qualification	34 (27)
University degree	18 (14)
Employment	
Full-time	49 (38)
Part-time	25 (20)
Not working	37 (29)
Retired	11 (9)
Student	5 (4)
Duration of gambling problem	
< 2 y	27 (21)
2–5 y	32 (25)
> 5 y	65 (51)
Clinical measures, mean ± SD	
GUS	14.94±11.68
WSAS	16.47±9.34
MSPSS	50.37±21.28
DASS-21	27.90±15.82
VGS: self-harm subscale	40.77±10.20
AUDIT	6.21±7.37
AISS	47.09±7.99
GRCS	67.27±25.15
TAI	53.96±10.44

GUS Gambling Urge Scale, *WSAS* Work and Social Adjustment Scale, *MSPSS* Multidimensional Scale of Perceived Social Support, *DASS21* Depression Anxiety and Stress Scale, *VGS* Victorian Gambling Screen, *AUDIT* Alcohol Use Disorders Identification Test, *AISS* Arnett Inventory of sensation Seeking, *GRCS* Gambling Related Cognition Scale, *TAI* Trait Anxiety Inventory

Data are presented as number (percentage) unless otherwise indicated. Percentages not always based on 127 participants owing to missing data

Three predictor variables accounted for significant portions of the variance at the 5% level. Higher GUS scores ($\beta=0.254$, $p=0.001$), DASS21 depression subscale scores ($\beta=0.471$, $p=0.027$), and GRCS scores ($\beta=0.08$, $p=0.05$) were all significantly associated with higher VGS scores. A plot of predicted VGS scores by GUS scores while holding all other independent variables constant at their mean are presented in Fig. 1. The graph shows that

Table 2 Correlation between Victorian Gambling Screen self-harm subscale scores, clinical and demographic variables

Predictor variables	Self-harm VGS score		
	Correlation coefficient[a]	*P*- value	Advance to regression model?
Demographic			
Age, years	-0.179	0.044	YES
Gender	-0.052	0.564	
Marital status	0.010	0.908	
Highest education level	-0.043	0.631	
Employment	-0.001	0.988	
Duration of gambling problem	0.145	0.108	
Clinical measures			
GUS	0.529	<0.001	YES
WSAS	0.501	<0.001	YES
MSPSS	-0.179	0.044	YES
DASS21 subscales:			
Depression	0.512	<0.001	YES
Anxiety	0.408	<0.001	YES
Stress	0.458	<0.001	YES
AUDIT	0.146	0.101	
AISS	-0.041	0.644	
GRCS	0.440	<0.001	YES
TAI	0.408	<0.001	YES

[a] Pearson's product moment correlation coefficient

GUS Gambling Urge Scale, *WSAS* Work and Social Adjustment Scale, *MSPSS* Multidimensional Scale of Perceived Social Support, *DASS21* Depression Anxiety and Stress Scale, *VGS* Victorian Gambling Screen, *AUDIT* Alcohol Use Disorders Identification Test, *AISS* Arnett Inventory of sensation Seeking, *GRCS* Gambling Related Cognition Scale, *TAI* Trait Anxiety Inventory

the confidence interval is smaller for scores between 0 and 30 and increases as scores move to higher values. Predicted values are more likely to have less error with lower GUS scores.

For depression as measured by the DASS21, the predicted VGS scores are presented in Fig. 2. The graph shows that the confidence interval increases with increasing depression scores.

For GRCS, the predicted VGS scores are presented in Fig. 3. The graph shows that the confidence interval is generally smaller with GRCS scores in the range 70 to 100 and increases at lower and higher levels.

Discussion

The purpose of this study was to identify predictors of gambling severity in treatment seeking problem gamblers at intake. Clinical characteristics of the sample included a relatively high proportion scoring in the extremely severe range on the depression (37.5%), anxiety (22.8%), and stress (20.5%) subscales of the DASS21. Approximately half of the sample (51%) reported duration of problem gambling greater than 5 years and 30.7% reported either harmful or likely dependant alcohol use.

Table 3 Results of the multiple linear regression analysis for the self-harm Victorian Gambling Screen

	R^2	F Change	*P*- value
Block 1	0.275	15.80	<0.001
Block 2	0.332	5.77	0.004
Block 3	0.453	7.66	0.001
Block 4	0.460	1.20	0.277
	β	Robust SE	*P*- value
DASS21 subscales:			
Depression	0.471	0.209	0.027
Anxiety	-0.170	0.264	0.522
Stress	0.083	0.316	0.794
TAI	-0.001	0.105	0.989
WSAS	0.182	0.100	0.072
MSPSS	0.018	0.033	0.585
GUS	0.254	0.074	0.001
GRCS	0.080	0.040	0.050
Age	-0.072	0.066	0.277

Significance and R^2 for each of the blocks in the model are shown together with the betas for all variables in the final model

GUS Gambling Urge Scale, *WSAS* Work and Social Adjustment Scale, *MSPSS* Multidimensional Scale of Perceived Social Support, *DASS21* Depression Anxiety and Stress Scale, *GRCS* Gambling Related Cognition Scale, *TAI* Trait Anxiety Inventory

Using block-wise multiple regression we found depression, gambling urge, and gambling related cognitions significantly predicted severity of problem gambling symptoms measured on the Victorian Gambling Screen. It makes clinical sense that gambling urge and related cognitions were found to influence severity as both appear to be conceptually part of gambling related pathology. Increased physical arousal in response to gambling cues can influence cognitions and attention is then focussed on erroneous beliefs relating to winning and losing (Sharpe 2002). Similar interactions between physiology and cognitions can also

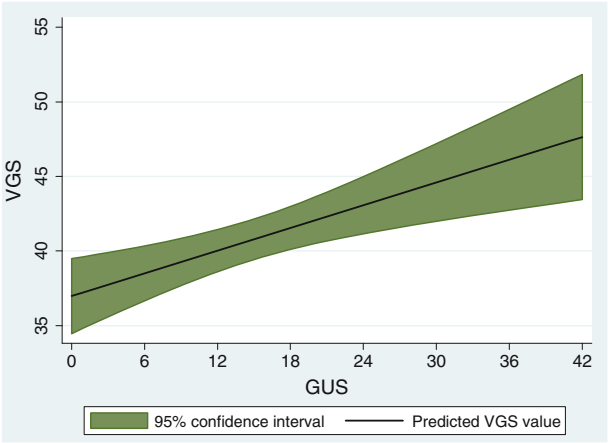

Fig. 1 Predicted Victorian Gambling Screen (VGS) scores by Gambling Urge (GUS). Increasing GUS scores indicate increasing urges to gamble

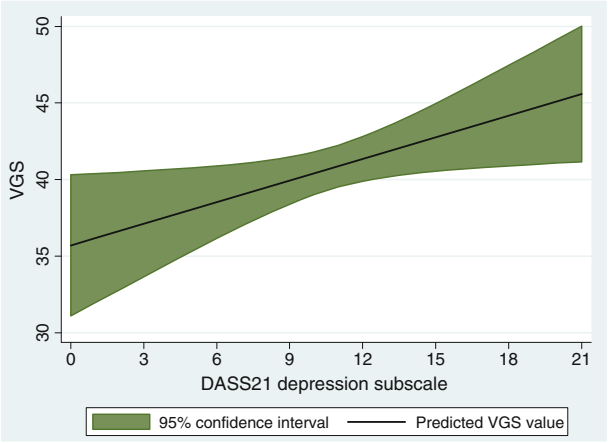

Fig. 2 Predicted Victorian Gambling Screen scores (VGS) by DASS21 depression subscale. Increasing DASS21 depression scores indicate increasing depressive symptoms

occur in other conditions such as anxiety disorders where increased physiological arousal in the fear response interplays with irrational or catastrophic cognitions.

Joukhador & MacCallum (Joukhador et al., 2003) found that problem gamblers held more distorted or irrational beliefs than social gamblers and a recent study of poker players found that problem gambling is significantly related to distorted cognitions (Mitrovic and Brown 2009). To date, there is much literature around the notion of urge in relation to substance use. There is some literature written in relation to gambling 'urge' (Moodie and Finnigan 2005; Sodano and Wulfert 2010) and more as gambling shows further crossover with an addictions model or conceptualisation, despite it being non-chemical (Marks 1990). Urge is normally talked about in the context of addiction as a physiological craving for a substance, such as nicotine, alcohol or other drugs. As gambling is not the ingestion of a substance, and cannot be labelled an addiction per se, there is some confusion about the description of an urge in relation to a non-ingestible addiction such as gambling.

In an addictions model, craving to use drugs is thought to precipitate cognitions that focus on using the drug. Gambling is often conceptualised in a similar way, particularly due to the cross over between drug and alcohol pathology and gambling pathology (withdrawal, zoning out, increased irritability if trying to stop, needing to bet more and more to get the same effect)

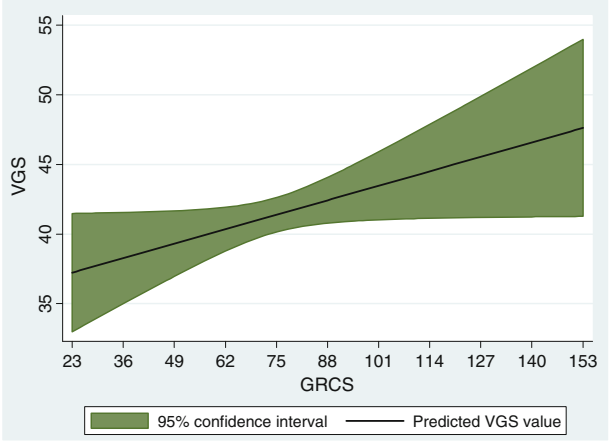

Fig. 3 Predicted Victorian Gambling Screen (VGS) scores by Gambling Related Cognitions (GRCS). Increasing GRCS scores indicate increasing gambling related cognitions

(American Psychiatric Association 2000). If so, it may indicate that urge tends to precipitate gambling related cognitions. In regard to treatment, this could indicate that if treatment is initially focused on treating the urge, the cognitions may abate as urges die off; however, it is important to note that further research is needed on the treatment of pathological gambling.

Depression was also found to be a significant predictor of gambling severity. The DASS21 provided a general measure of psychological distress and comprises of depression, anxiety, and stress subscales. Other studies have shown a significant association between depression and problem gambling (Battersby et al. 2006; Black and Moyer 1998; Dannon et al. 2004; Griffiths 1995; MaCCallum and Blaszczynski 2003). In a pathways model of problem gambling Blaszczynski and Nower (Blaszczynski and Nower 2002) proposed anxiety and affective disorders as potential precursors to a gambling problem, or as a result of the problem, or perhaps even part of greater psychopathology. The model suggested that these differences have implications for treatment planning.

Better treatment outcomes will result from treatment planning accounting for the presence of co-occurring conditions and temporal relationships. For example a person may start gambling and end up with an affective disorder as a result, and therefore a greater likelihood that with direct treatment of the gambling problem the mood or depression may change of its own accord (Blaszczynski and Nower 2002). However, if a person starts gambling as a result of precipitating mental health problems, these other problems or disorders may need equal attention when treating the gambling problem. This would place the person in a better position to fully recover and also to assist with relapse prevention.

Other candidate predictor variables of problem gambling severity included sensation seeking traits, a related construct of impulsivity. Previous research has found a significant association between impulsivity and gambling severity (Black and Moyer 1998; Blaszczynski et al. 1989, 1997a; Petry 2001). It is somewhat surprising that there was no correlation found between sensation seeking traits and gambling severity in this study. This perhaps could be explained by the use of the Arnett Inventory of Sensation Seeking (AISS) measure in relation to impulsivity. The AISS has been used predominantly for substance users, and has not been used widely within problem gambling populations. More studies need to be undertaken using this measure with problem gamblers.

Limitations of this study are acknowledged. Firstly, the sample was based on a treatment seeking population of problem gamblers entering treatment for cognitive behavioural psychotherapy. Inferences from these findings may not apply to non-treatment seeking problem gamblers or problem gamblers seeking treatment from other services. Secondly, while there has been some evidence that the Gambling Urge Scale (GUS) is a useful and effective way of measuring urge ratings in problem gamblers, it is noted that this is a relatively short and subjective measure. It does not actively measure physiological responses to certain cues or triggers in association with gambling.

Thirdly, the VGS was originally developed as an instrument to screen for problem gambling and only recently validated as a measure in a clinical sample (Ben-Tovim et al. 2001; Tolchard & Battersby, 2010). It's use in clinical settings requires further validation. Alternate severity measures may include gambling behaviour as an outcome variable. However, these results indicate the VGS would be a useful measure for identifying problem gambling and assessing gambling related urges and cognitions, therefore reducing redundancy often encountered with multiple assessment tools. Also measures of psychological distress were based on the DASS-21 which have no direct implications for diagnostic classification. Further studies could assess and diagnose conditions such as depression and anxiety using Structured Clinical Interviews as per the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2000)

The primary analyses focused on baseline data of participants recruited for a larger study. Further research could focus on longitudinal factors such as whether predictors of gambling severity vary over time, and study problem gamblers from a diversity of treatment services and non-treatment seeking problem gamblers so as to enhance generalisability of results.

In summary this study found that depression, urge and gambling related cognitions were predictors of gambling severity. Clinicians developing or implementing treatment programs for gambling problems may need to take into account the likelihood that many of their clients may have strong urges to gamble and distorted cognitions, elevated depression levels, and as a result, increased suicidal ideation. In addition, much of the sample had high levels of stress and anxiety which may also impact on treatment planning and attrition rates. In general, problem gamblers in this sample also have features of other psychological disorders and alcohol misuse problems.

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