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ORIGINAL PAPER

Measuring Self-efficacy in Gambling: The Gambling Refusal Self-Efficacy Questionnaire

Leanne M. Casey · Tian P. S. Oei · Katherine M. Melville · Emily Bourke · Peter A. Newcombe

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Abstract This paper reports on the development and psychometric properties of a Gambling Refusal Self-Efficacy Questionnaire (GRSEQ). Two hundred and ninety-seven gamblers from both normal and clinical populations completed an initial set of 31-items of which 26 were selected for inclusion in the final version of the GRSEQ. A series of factor analyses showed four clear factors accounting for 84% of the variance. These factors can be summarised as situations and thoughts associated with gambling, the influence of drugs on gambling, positive emotions associated with gambling and negative emotions associated with gambling. The GRSEQ total score and factors scores showed high internal consistency (Cronbach's alpha ranging from 0.92 to 0.98). Participants experiencing problems with gambling scored significantly lower on the GRSEQ, and discriminant analyses showed that the scale is able to correctly classify the non-problem (i.e., community and student samples) and problem gamblers (i.e., clinical sample). Furthermore, the GRSEQ showed significant negative relationships with other gambling-related variables (gambling urge and gambling-related cognitions) and negative mood states (depression, anxiety and stress) and was shown to be sensitive to change in treatment of pathological gambling. The results suggest that the GRSEQ is a useful measure of gambling refusal self-efficacy that is suitable for assessment of gamblers from both normal and clinical populations.

Keywords Assessment · Gambling · Problem gambling · Psychometric · Self-efficacy

Pathological gambling involves a failure to resist impulses to gamble and often results in negative consequences for the gambler and their families (Blaszczynski et al. 1998). For instance, individuals with higher levels of gambling behaviour show higher levels of

L. M. Casey (✉) · K. M. Melville · E. Bourke
School of Psychology, Griffith University, Mt Gravatt Campus, Brisbane 4111 QLD, Australia
e-mail: l.casey@griffith.edu.au

T. P. S. Oei · P. A. Newcombe
School of Psychology, University of Queensland, Brisbane, QLD, Australia

gambling-related cognitions, gambling urges, depression, anxiety and stress (Blaszczynski and McConaghy 1989a; Dickerson et al. 1991; Raylu and Oei 2002, 2004a, b). Increasingly, researchers and clinicians are identifying self-efficacy as a construct of central importance in the acquisition, maintenance and treatment of pathological gambling (Sylvain et al. 1997; Symes and Nicki 1997). Despite recognition of the salience of perceived self-efficacy amongst pathological gamblers, little is known regarding the ways in which gamblers across the continuum may vary on this construct. Such limited research attention may due in part to the lack of reliable and valid scales to assess gambling-related self-efficacy across both normal and clinical populations. This lack of standardised assessment measures presents a considerable challenge to researchers and clinicians seeking to further understand and explore the role of self-efficacy in normal and pathological gambling. This paper reports on the development of a measure of gambling-related self-efficacy intended for use in both normal and clinical populations.

Perceived self-efficacy refers to "beliefs in one's capabilities to organise and execute the courses of actions required to produce given attainments" (Bandura 1997). In terms of gambling behaviour, self-efficacy is defined as an individual's belief as to whether or not they could resist an opportunity to gamble in a given situation (Oei et al. 2005). The importance of self-efficacy has been demonstrated across a number of different addictive behaviours (Hasking and Oei 2007; Young et al. 1991). Individuals who have increased levels of perceived self-efficacy to control problem behaviours (i.e., cigarette smoking, alcohol or drug use) have been shown to be more likely to abstain from these behaviours throughout treatment than those with lower levels of perceived self-efficacy (Annis and Davis 1988; Condiotte and Lichtenstein 1981; Rounds-Bryant et al. 1997). Furthermore, the strength of an individual's self-efficacy following treatment has been found to predict maintenance of gains from treatment for cigarette smoking (Condiotte and Lichtenstein 1981) and problem drinking (Allsop et al. 2000).

Research demonstrating the role of self-efficacy in pathological gambling is, however, limited (May et al. 2003). Only a small number of studies can be identified that explored self-efficacy among pathological gamblers. Studies have suggested that individuals with higher levels of gambling behaviour may show lower levels of gambling refusal self-efficacy (May et al. 2003). One study, conducted by Symes and Nicki (1997), assessed gambling self-efficacy with adult pathological gamblers undertaking cue-exposure and response-prevention treatment. Self-efficacy was measured using the Self-Efficacy Questionnaire (SEQ) which is a 20-item questionnaire assessing situations that might trigger gambling. The SEQ was based on a scale examining self-efficacy in cigarette smokers (Nicki et al. 1984). Although no psychometric properties were reported for this adapted instrument, perceived self-efficacy was found to increase substantially following successful treatment. Another three studies (Ladouceur et al. 2001, 2003; Sylvain et al. 1997) assessed self-efficacy using two or three items reflecting personally relevant high-risk situations. Individuals were asked to rate how sure they were that they could control gambling in certain situations on a scale ranging from 0 'having no control' to 10 'having total control'. No psychometric properties were reported in regard to this measure however participants who completed treatment reported a significantly higher perception of self-efficacy compared with participants who did not receive treatment. Whilst these studies are limited by small sample sizes and the use of unvalidated measures, they provide preliminary evidence of the potential usefulness of exploring and targeting refusal self-efficacy among gamblers. Given such findings it is vital that we have reliable and valid means of measuring self-efficacy in relation to gambling.

When initial data collection began for the present study, no other adequate instruments for assessing perceived self-efficacy in relation to gambling existed. More recently, however, progress has been made with the development of the Gambling Self-Efficacy Questionnaire (GSEQ) (May et al. 2003) and the Gambling Abstinence Self-efficacy Scale (GASS) (Hodgins et al. 2004). The first measure, the GSEQ, is a 16-item self-report measure which was designed to assess an individual's perceived self-efficacy to control their gambling behaviour in a range of situations. Items on the GSEQ were based on items on the Situational Confidence Questionnaire 39 which is a 39-item self-report measure designed to assess the perceived ability to resist the urge to drink heavily in high-risk situations (Annis and Davis 1988). Items were also developed to represent Marlatt's (1985) eight high-risk categories for relapse. The eight categories include: pleasant emotions, unpleasant emotions, physical discomfort, personal control, urges, conflict with others, social pressure and pleasant times with others. Five doctoral students were enlisted to rate the representativeness of GSEQ items according to these categories. GSEQ items were also given to experts in self-efficacy and cognitive psychotherapy for addictive behaviours, to obtain input on the relevance of items and for suggestions of other items. Initial evaluations revealed the GSEQ to have good psychometric properties (i.e., test–retest reliability = 0.86, GSEQ significant correlations with SOGS and other gambling-related behaviours) (May et al. 2003).

Although the GSEQ represents a useful attempt to develop a measure of self-efficacy in the area of problem gambling, it has a number of important limitations. Firstly, the sample recruited by May et al. (2003) was vastly over-represented by university students (45% of sample) and is therefore unlikely to be representative of the total population of gamblers. Secondly, as only two items were included to represent each risk category defined by Marlatt (1985), it is highly questionable as to whether the items were sufficient to represent the construct of self-efficacy (DiClemente et al. 1995). Thirdly, pathological gamblers (i.e., a clinical sample) were not included in the original standardisation sample. As such, the GSEQ's utility for use among pathological gamblers in treatment and within treatment outcome research is limited. Finally, a factor analysis of the GSEQ revealed that only one factor accounted for the majority of variance. This appears inconsistent with the rationale used for item development, as the scale was developed to correspond to eight different risk situations. It is possible that a sample including pathological gamblers may have revealed a more complex factor structure which in turn would assist treatment of gamblers by providing better assessment of vulnerabilities and enhanced tailoring of treatment according to individual risk factors.

The second scale, the GASS, is comprised of 21-items that assess an individual's self-efficacy to not gamble in a range of situations. Items were derived from items on the Reasons for Drinking Questionnaire (Zywiak et al. 1996) which assesses the perceived ability to resist the urge to drink in high-risk situations representing Marlatt's (1985) eight relapse categories. Interviews were also conducted with ten active and recently recovered problem gamblers to obtain feedback on items and for suggestions and development of other items. Initial psychometric evaluations with a sample of 101 pathological gamblers revealed the GASS to have good psychometric properties (i.e., total score test–retest reliability = 0.86 and internal consistency = 0.93, GASS significant correlations with SOGS) (Hodgins et al. 2004). In addition, analyses demonstrated that the scale is comprised of four factors including: winning/external situations (alpha = 0.70), negative emotions (alpha = 0.87), positive mood/testing/urges (alpha = 0.70) and social factors (alpha = 0.81). Whilst the GASS addresses several of the limitations evident in GSEQ (i.e., use of a clinical sample, identification of a more complex factor structure) its utility for use

with a general population sample of gamblers is limited and it is questionable as to whether the items were sufficient to represent the range of high-risk situations encountered by problem gamblers.

In this article we report on the construction and validation of a measure of gambling refusal self-efficacy, the Gambling Refusal Self-Efficacy Questionnaire (GRSEQ), using a sample of the general population of gamblers that included a clinical sample of pathological gamblers.

Method

Participants

Two hundred and ninety-seven adults who were legally eligible to gamble (over age 18) were recruited for this study. All participants were living in Brisbane or surrounding regions, and had taken part in a gambling activity of some kind, at some time in their life. To obtain a heterogenous sample, gamblers included 90 individuals living within the local community, 100 university students and 107 pathological gamblers who had volunteered to take part in a Cognitive Behaviour Therapy program (the clinical sample). The mean age of participants was 36 years (SD = 14.61; range = 18–80 years). Advertisements placed on local community notice boards were used to recruit individuals living within the local community. Students were recruited from Griffith University and the University of Queensland and were offered course credit in return for their participation. Advertisements placed in local and state newspapers, television and radio interviews and Internet links from various search engines and mental health websites were used to recruit pathological gamblers. Pathological gamblers were excluded from the study if they had been diagnosed with a severe personality disorder, Bipolar disorder or hypomania. Table 1 outlines demographics for the community, student and clinical samples separately.

Measures

South Oaks Gambling Screen (SOGS) (Lesieur and Blume 1987). The SOGS is a 20-item self-report measure which identifies problem gamblers (SOGS ≥ 5). A cut-off of 5 was used to distinguish problem gamblers from non-problem gamblers in the current study. The SOGS has been found to be effective in identifying people with gambling problems among university students and substance abusers (Breen and Zuckerman 1999; Ledgerwood and Downey 2002). The measure has been used frequently and has been shown to have good reliability (Cronbach alpha = 0.97; test–retest = 0.71, $p < .001$) (Lesieur and Blume 1987). Cronbach alpha in current study was similarly high (0.94).

Gambling-Related Cognitions Scale (GRCS; (Raylu and Oei 2004a). The GRCS is a 23-item questionnaire designed to identify the distorted beliefs common amongst pathological gamblers. Analyses have documented that the scale is comprised of five factors including: the illusion of control, interpretative bias, predictive control, expectations of gambling and perceived inability to stop gambling. Participants use a 7-point Likert scale to indicate the extent to which they agree with the value expressed in each statement. Scoring consists of totalling the values such that higher scores indicate higher levels of cognitive distortions. The scale has shown to have high internal consistency (Cronbach alpha = 0.93) and each subscale has been shown to have moderate to high reliability (Raylu and Oei 2004a).

Table 1 Demographic characteristic of participants

Variable	Clinical %	Student %	Community %
Gender			
Male	61	26	40
Female	39	74	60
Marital status			
Married	28.0	9.0	54.4
Single	29.0	66.0	17.8
Living together/Engaged	17.8	19.0	16.6
Divorced/Separated/Widowed	25.0	5.0	11.1
Did not report	1.9	1.0	0.0
Annual income			
<$10,000 AU	10.3	39.0	2.2
$10,000–29,000	32.7	54.0	28.9
$30,000–49,000	30.0	6.0	36.7
>$50,000	27.1	1.0	30.0
Did not report	0.0	0.0	2.2
Education (highest level)			
Primary	0.9	0.0	0.0
Junior secondary	28.0	3.0	12.2
Senior secondary	19.6	69.0	26.7
Tertiary diploma	49.5	28.0	61.1
Did not report	1.9	0.0	0.0
Employment			
Full time	53.3	1.0	70.0
Part time	15.9	35.0	22.2
Full time students	2.8	58.0	0.0
Other	21.6	6.0	6.7
Did not report	6.5	0.0	1.1
Race/Ethnicity			
Caucasian	76.6	80.0	85.6
Asian	2.8	3.0	2.2
Other	14.0	15.0	10.0
Did not report	6.5	2.0	2.2
Religion			
Catholic	33.6	35.0	38.9
No religion	36.4	36.0	25.6
Protestant	14.0	3.0	15.6
Other	14.0	22.0	18.8
Did not report	1.9	4.0	1.1

Significant positive low correlations have been found with mood (depression, anxiety and stress), and significant positive moderate correlations have been found with gambling behaviour. Internal consistency in the current study was good (Cronbach's alpha = 0.94).

Gambling Urge Scale (GUS) (Raylu and Oei 2004b). The GUS is a six-item questionnaire developed to assess gambling-related urges. Participants rate their agreement with each item using a 7-point semantic differential scale. The GUS has been shown to have high internal consistency (alpha = 0.81) and good reliability (Raylu and Oei 2004b). Significant positive correlations have been demonstrated with mood (depression, anxiety and stress), and with other gambling-related instruments including the GRCS. Internal consistency in the current study was good (Cronbach's alpha = 0.96).

Depression Anxiety and Stress Scales (DASS-21) (Lovibond and Lovibond 1995). The DASS-21 is a 21-item self-report instrument that measures the affective states of depression, anxiety and stress. Respondents are required to rate each item on a 4-point Likert scale according to how much each item applied to them over the past week. The scales of the DASS-21 have been shown to have high internal consistency, with Cronbach's alphas of 0.94 for depression, 0.87 for anxiety and 0.91 for stress (Antony et al. 1998). Antony et al (1998) provided support for the scale's concurrent validity through contrasts with the Beck Depression Inventory, the Beck Anxiety Inventory and the State-Trait Anxiety Inventory. The DASS-21 has also been shown to have acceptable test–retest reliability. In the current sample coefficient alphas were: 0.89 for the depression subscale, 0.84 for the anxiety subscale and 0.89 for the stress subscale.

General Self-Efficacy Inventory (GSE) (Sherer et al. 1982). The GSE is a 17-item self-report measure designed to assess generalised self-efficacy expectations. Respondents are required to indicate on a 9-point Likert scale how strongly they agree with each item. The GSE is one subscale of the Self-Efficacy Scale (Sherer et al. 1982). The Inventory has been shown to have high reliability (Cronbach's alpha = 0.86) and correlates with other measures of personality characteristics (Internal-External Scale = –0.29, Marlowe-Crowne Social Desirability Scale = 0.43). Coefficient alpha in the current study was 0.66.

All respondents were also asked questions on gender, income, education, age, marital status, employment, religion and ethnic background.

Procedure

Construction of the Gambling Refusal Self-Efficacy Questionnaire (GRSEQ)

The GRSEQ was developed as a self-report measure to assess an individual's perceived self-efficacy in refusing to gamble in a variety of situations or under certain circumstances. An initial pool of items was generated based on a previously published measure of alcohol-related self-efficacy as well as clinical experience in treating pathological gambling. Items were derived from the Drinking Refusal Self-Efficacy Questionnaire (DRSEQ) (Young and Oei 1996; Young et al. 1991), which is a 31-item self-report measure designed to assess an individual's beliefs about their own ability to refuse an alcoholic drink in given high-risk situations. The DRSEQ has good psychometric properties (i.e., test–retest reliability and Cronbach's alpha > 0.80) and demonstrated ability to predict level of alcohol consumption, discriminate between problem and non-problem drinkers and also to predict response to treatment (Oei et al. 2005; Young and Oei 1996). Furthermore, a principal axis factor analysis with oblique rotation revealed that all items on the scale loaded unambiguously onto one of three factors: social pressure (e.g., 'when my friends are drinking'), emotional relief (e.g., 'when I feel upset') and opportunistic self-efficacy (e.g., 'when I am by myself') (Young and Oei 1996).

As noted, items for the GRSEQ were also generated based on the test developers' clinical experience with pathological gamblers and knowledge in the area, including the eight high-risk categories for relapse defined by Marlatt (1985). However, as there is no clear evidence that Marlatt's (1985) factors are inclusive of all the cues encountered by problem gamblers, additional categories of items were added in recognition of specific gambling-related cues encountered by pathological gamblers. Variables found to act as triggers for gambling include alcohol use (Baron and Dickerson 1999; Kyngdon and Dickerson 1999); negative emotions such as stress (Friedland et al. 1992), frustration and depression (Corless and Dickerson 1989; Dickerson 1993); proximity to gambling activities and gambling-related cognitions (Raylu and Oei 2002; Sharpe 2002). As such, the GRSEQ was developed to contain items reflecting five domains: situations associated with gambling (e.g., other people gambling), thoughts associated with gambling (e.g., remembering wins), the influence of ingesting substances on gambling behaviour (e.g., consuming alcohol), negative emotions associated with gambling (e.g., feeling sad or distressed) and positive emotions associated with gambling (e.g., feeling excited). Individuals respond to each item on the GRSEQ by indicating how confident they are that they could refuse to gamble on a scale from 0 *'No Confidence, Cannot refuse'* to 100 '*Extreme Confidence, Certain can refuse'* in increments of 10. A total score is obtained by calculating an average response to all items. Thirty-one items were developed for inclusion in the GRSEQ.

Distribution of the Questionnaires

A questionnaire package with consent form and information sheet was distributed to the participants to complete in their own time. The study received ethical clearance from the University's human ethics committee. Where a respondent had completed at least 70% of the items in a scale, their data was retained for relevant analyses (Tabachnik and Fidell 1996). If less than 70% of data for a scale was provided, this scale was treated as missing for that respondent.

The clinical sample were administered the questionnaires prior to starting treatment. Those assigned to the wait-list group completed the questionnaires again 6 weeks later, before being offered the CBT treatment. The second set of data from these individuals in the wait-list condition was used only to examine test–retest reliability and not included in the main analyses. One hundred psychology students completed the questionnaires in groups, in a classroom at the university under the supervision of one of the researchers. Community volunteers were required to complete the questionnaire at their convenience and to return completed copies to the place where questionnaires had been previously dispensed. Prompts, up to a maximum of three times, were made to individuals who had not returned their questionnaires.

The impact of the sequential order of questionnaires (i.e., order effect) was controlled for in the community and student samples. In particular, the order of presentation of the six questionnaires was generated using a random numbers table (Mitchell and Jolley 2001). Order effects were minimized by presenting one order of the questionnaires to one half of the participants and the reverse order to the other half of participants. Unfortunately order effects were not controlled for in the clinical sample. This is a possible limitation of this study, however it should be noted that it is not usual practice to control for order effects in the administration of measures in a treatment outcome study.

Construction of the Final Gambling Refusal Self-Efficacy Questionnaire (GRSEQ)

An unrotated principal components analysis was performed on all 31 items. The following process was used to reduce the 31-item questionnaire to the final 26-item questionnaire. First, based on Stevens' (1992) suggestion, any loadings less than 0.4 were suppressed. One item did not load saliently on any factor and was deleted. To eliminate any items which were very similar to one another, inter-item correlations and item-total correlations were generated for all 31 items. Based on this, four further items were deleted as they correlated significantly highly with another item ($r > .90$). On the basis of DeVillis's (1991) suggestion, the item with the lower item total correlation was deleted. Data from all 297 participants (i.e., community, student and clinical samples combined) were included in this analysis.

Descriptive information for the remaining 26 items was obtained to assess the range of responses. This included the mean, standard deviation and maximum and minimum scores for each item. Although a large number of respondents endorsed the extreme levels of confidence on majority of items, all points in the scale were used and so were retained.

Analyses of the 26-item GRSEQ

A series of factor analyses were used to explore and confirm the factor solution of the GRSEQ. Cronbach's alphas were used to assess the reliability of the GRSEQ. The criterion-related, convergent and divergent validity of GRSEQ was assessed using Spearman bivariate correlations between GRSEQ scales and GRSEQ total score with the comparison measures, SOGS, DASS, GSE, GRCS and GUS. The discriminant validity of the GRSEQ scales was assessed using a discriminant analysis. Investigation revealed that the distribution of the GRSEQ scales differed severely from normality (i.e., positively skewed) and were unable to be transformed. As a result, a series of chi-squared analyses were used to explore the scales' construct validity, as well as gender differences in the GRSEQ scores. As GRSEQ data taken only from the clinical population was normally distributed, *t*-tests were used were used to assess the sensitivity of the GRSEQ to changes in gambling refusal self-efficacy following psychological treatment (i.e., six face-to-face sessions of individual cognitive behavioural therapy).

Results

Demographic Characteristic of Participants

The community, student and clinical samples were significantly different with regards to gender, $\chi^2\,(2, N = 295) = 26.35, p < .001$, marital status, $\chi^2\,(6, N = 294) = 79.13, p < .001$, annual income, χ^2 (6, $N = 295$) = 98.17, $p < .001$, education, χ^2 (6, $N = 295$) = 73.47, $p < .001$, employment, $\chi^2\,(6, N = 289) = 183.74, p < .001$ and religion, $\chi^2\,(6, N = 290) = 12.99, p < .05$. Individuals in the student sample were less likely than those in the clinical or community samples to be married, protestant and employed full-time, and were more likely to earn an income under $30,000 and have a senior secondary education. Individuals in the clinical sample were more likely to be male than those in the student or community samples. The community, student and clinical samples were also significantly different with regards to age, $F(2, 292) = 126.83$, $p < .001$. The community sample had an average age of

41.70 years (*SD* = 12.99), the student sample had an average age of 22.58 (*SD* = 6.23) and the clinical sample had an average age of 44.83 (*SD* = 11.93). There were no statistically significant ethnicity differences (χ^2 (4, *N* = 286) = 1.76)) between the community, student and clinical samples.

Internal Structure of the GRSEQ

An initial principal components analysis was performed on the 26-items of the GRSEQ to estimate the likely number of factors and to check the factorability of the correlation matrices. Data from all 297 participants (i.e., community, student and clinical samples combined) was included in this analysis. The Kaiser Meyer Olkin measure of sampling adequacy was 0.948. This suggests that the patterns of correlation are relatively compact and as such factor analysis should produce distinct and reliable factors (Field 2000). Barlett's test of Sphericity was significant, $p < .001$, indicating that there were some relationships between the variables. Therefore, factor analysis was considered appropriate. The Scree test (Cattell 1966) and Kaiser's criterion (i.e., eigenvalues > 1) clearly suggested four factors for rotation using a principal axis factor analysis. An oblique rotation was selected over an orthogonal rotation, as it revealed a superior simple structure and because of high correlations between the factors.

The factor structure of the questionnaire is presented along with salient loadings above 0.40 in Table 2. Table 2 also reports on the eigenvalues, internal consistency, mean and standard deviation of the factors as well as the percentage of variance accounted for by each factor. No items had substantial loadings on more than one factor. Three of the four factors were consistent with the priori domains represented in the GRSEQ: the influence of drugs on gambling behaviour (i.e., Factor II Drugs), positive emotions associated with gambling (i.e., Factor III Pos-Emotions) and negative emotions associated with gambling (i.e., Factor IV Neg-Emotions). The other factor (i.e., Factor I Situations/Thoughts) appeared to assess situations associated with gambling, as well as thoughts associated with gambling. The four-factor solution accounted for 84.38% of the total variance. Cronbach's alpha coefficients were high for all factors. The lowest measure of internal consistency was found for Factor 2 drugs (alpha = 0.92), however this is still well above the accepted limit of 0.70 (Cicchetti 1994; Cicchetti and Sparrow 1990). Cronbach's for the overall scale was also high (alpha = 0.98). The extent of correlation between the factors (i.e., subscales) and total score was also high. As shown in Table 3, all factors correlated significantly and highly with other factors and the total score.

Within the same sample, a confirmatory factor analysis (CFA) was then used on a posthoc basis to compare different models to determine which most fully explained the data set. The principal components analysis identified four dimensions to gambling refusal self-efficacy but these were highly correlated, rs ≥ .62, thus arguably a one-factor model may have provided a better representation of the data. The use of CFA enabled a comparison of the four-factor solution established by exploratory factor analysis (with all factors correlated) with a possible one-factor model where gambling refusal self-efficacy was seen to be reflected as a unidimensional construct. The data was examined using LISREL 8.7 (Joreskog and Sorbom 2004) using the covariance matrices and a maximum likelihood estimation technique. As the items were highly skewed, Satorra-Bentler scaled χ^2 and robust standard errors were requested as they are more robust to violations of normality.

Table 2 Factor structure of the gambling refusal self-efficacy questionnaire[a]

Item	Four factor oblique solution			
	I	II	III	IV
How confident are you that you could refuse gambling ...				
When I'm in places where I usually gamble	0.947			
When my friends were gambling	0.924			
When I saw other people gambling	0.903			
When someone offered me the chance to gamble	0.884			
When I was thinking that it is likely that I would win	0.881			
When I was having money problems	0.849			
When I was by myself and had the chance to gamble	0.789			
When I was remembering wins I have had in the past	0.782			
When I was thinking of how I have good luck when I gamble	0.775			
When I was thinking of ways to solve my money problems	0.761			
When I was thinking how much money I have lost	0.703			
When I was thinking of things I could do to help me win	0.604			
When I had been smoking marijuana		0.883		
When I had been taking speed		0.879		
When I had been taking anti-anxiety drugs		0.757		
When I had been smoking tobacco		0.736		
When I had been drinking coffee		0.670		
When I was feeling happy			0.897	
When I was feeling interested			0.895	
When I was feeling relieved			0.874	
When I was feeling excited			0.864	
When I was feeling satisfied			0.783	
When I was feeling ashamed				–0.603
When I was feeling fearful				–0.588
When I was feeling guilty				–0.573

Table 2 continued

Item	Four factor oblique solution			
	I	II	III	IV
When I was feeling disgusted				–0.557
Eigenvalue	17.68	1.87	1.28	1.11
% of variance	68.01	7.18	4.93	4.26
Cronhach's Alpha	0.98	0.92	0.94	0.97
Mean (*SD*)	773.21 (406.98)	424.08 (125.66)	356.61 (155.42)	279.37 (145.62)

[a] Only salient loadings above .40 are reported; $n = 277$

Table 3 Factor intercorrelations between factors and total score

Factor	I Situations/Thoughts	II Drugs	III Pos-Emotions	IV Neg-Emotions	Total
I Situations/Thoughts	1.00				
II Drugs	0.70**	1.00			
III Pos-Emotions	0.82**	0.62**	1.00		
IV Neg-Emotions	0.85**	0.67**	0.76**	1.00	
Total	0.97**	0.76**	0.87**	0.89**	1.00

** Significant difference at $p < 0.01$

$n = 277$

This first model examined was a one-factor model in which all 26 items were predicted to load on a single factor of gambling refusal self-efficacy. The second model examined the fit of the four correlated factors that emerged from the exploratory factor analysis. The 26 items were proposed to load onto the dimensions of situations/thoughts, drugs, positive emotions, and negative emotions.

Table 4 presents a summary of the individual model results including χ^2 and fit indices. There was a significant difference between the parameters of the data and the hypothesized one-factor model, χ^2 (299) = 1,241.39, $p < .001$, although all indices were strong at $> .90$. Although the analysis of Model 2 also indicated a significant difference between the data and the model, χ^2 (293) = 446.51, $p < .001$, the indices of fit were very strong at $\geq .99$, and the Root Mean Squared Error of Approximation (RMSEA) $< .05$, reflecting a good fit. Furthermore, the change in χ^2 from Model 1 to Model 2 in relation to change in degrees of freedom was statistically significant. This suggests that the 4 correlated factor model is a better fit to the data than the one-factor model.

Table 4 Results of the confirmatory factor analysis for the GRSEQ

Model	χ^2	df	*p*	ΔAIC	ΔCAIC	CFI	NFI	NNFI	RMSEA
Model 1	1241.39	299	0.000	1345.39	1573.38	0.97	0.96	0.97	0.12
Model 2	446.51	293	0.000	562.51	816.81	1.00	0.99	1.00	0.049
Model 2–Model 1	794.88	6	0.000						

Model 1: One-factor; Model 2: Four correlated factors

Test–Retest Reliability of the Scale

A preliminary examination of the test–retest reliability of the scale was estimated by correlations of the factor scores over 6 weeks in a sample of wait-listed participants in a clinical trial. Test–retest reliability was assessed on a subset of pathological gamblers (n = 18), who completed the GRSEQ again 6 weeks after the initial administration. Test–retest correlations were less than optimal - Total Score (r = 0.57); Factor 1 situations/thoughts (r = 0.63); Factor 2 drugs (r = 0.64), Factor 3 positive emotions (r = 0.73) and Factor 4 negative emotions (r = 0.57).

Validity

Criterion-related Validity

To establish the concurrent validity of the questionnaire, gambling behaviour assessed via the SOGS was correlated with the GRSEQ. Based on the results of prior research (May et al. 2003), we expected a negative correlation between these variables. The results demonstrated evidence of criterion-related validity with the GRSEQ subscale and total scores showing significant negative correlations with SOGS scores. The correlations are shown in Table 5.

Convergent Validity

To investigate the convergent validity of the questionnaire, a range of variables (e.g., gambling-related cognitions, gambling urge, depression, anxiety and stress) that have been shown to be related to problem gambling (Blaszczynski and McConaghy 1989a, b; Dickerson et al. 1991; Raylu and Oei 2002, 2004a, b) were correlated with the GRSEQ. Given that individuals with higher levels of gambling behaviour show lower levels of gambling refusal self-efficacy, we expected a negative correlation between these variables and gambling refusal self-efficacy. The results demonstrated evidence of convergent validity with the GRSEQ subscales and GRSEQ total score showing significant negative

Table 5 Correlations between GRSEQ scales and SOGS, DASS subscales, GSEQ, GRCS and GUS

Factor	GRCS	GUS	DASS			GSEQ	SOGS
			Depression	Anxiety	Stress		
I Situations/Thoughts	–0.80**	–0.74**	–0.56**	–0.36**	–0.46**	0.55*	–0.82**
II Drugs	–0.53**	–0.51**	–0.49**	–0.36**	–0.41**	0.39*	–0.56**
III Pos-Emotions	–0.73**	–0.65**	–0.52**	–0.32**	–0.38**	0.57*	–0.72**
IV Neg-Emotions	–0.73**	–0.69**	–0.57**	–0.35**	–0.46**	0.56*	–0.79**
GRSEQ Total	–0.80**	–0.74**	–0.58**	–0.37**	–0.46**	0.56**	–0.83**

* Significant difference at $p < .05$

** Significant difference at $p < .01$

n = 277

correlations with gambling-related cognitions (GRCS), gambling urge (GUS), depression, anxiety and stress (DASS). The correlations are shown in Table 5.

Divergent Validity

In order to investigate the divergent validity of the questionnaire, the GRSEQ was correlated with the GSEQ. Given that the GRSEQ and GSEQ measure similar, however distinct constructs, we expected that gambling refusal self-efficacy should display a low to moderate positive correlation with general self-efficacy. The results demonstrated evidence of divergent validity with the GRSEQ subscale and total scores showing moderate positive correlations with the GSEQ. The correlations are shown in Table 5.

Construct Validity

As distribution of the GRSEQ scales differed severely from normality, a series of chi-squared analyses were used to investigate the construct validity of the questionnaire. Categorisation was based on percentile scores where 0–30% represents 'low refusal self-efficacy', 31–70 'moderate refusal self-efficacy' and 71–100 represents 'high refusal self-efficacy'. These percentile cut-offs were selected to allow for approximately equal numbers of participants in each category. Table 6 summarises the descriptive statistics for the current sample based on these categories.

Differences between the non-problem (i.e., community and student samples) and problem gamblers (i.e., clinical sample) scores on the GRSEQ were explored. We expected that problem gamblers would be more likely to report having low gambling refusal self-efficacy than the non-problem gamblers. Significant differences were found between non-problem and problem gamblers on all of the GRSEQ subscales: situations/thoughts, χ^2 (2, $N = 297$) = 179.53, $p < .001$, drugs, χ^2 (2, $N = 235$) = 54.82, $p < .001$, positive emotions, χ^2 (2, $N = 289$) = 89.84, $p < .001$, and negative emotions, χ^2 (2, $N = 287$) = 167.33, $p < .001$. There was also a significant group difference in the total GRSEQ score (χ^2 (2, $N = 297$) = 182.07, $p < .001$). In all cases, the problem gamblers were more likely to report having low gambling refusal self-efficacy than the non-problem gamblers.

Differences between males and females levels of gambling refusal self-efficacy were also explored. There was a significant gender difference on the GRSEQ subscales assessing situations/thoughts, χ^2 (2, $N = 295$) = 17.21, $p < .001$, drugs, χ^2 (2, $N = 233$) = 11.22, positive emotions, χ^2 (2, $N = 287$) = 17.23, $p < .001$ and negative emotions, χ^2 (2, $N = 285$) = 12.98, $p < .001$. Males were more likely to report having low gambling refusal self-efficacy than females on all subscales. There was also a significant gender difference

Table 6 Number (*N*) and percentage (%) of respondents in each GRSEQ category

	I Situations/Thoughts		II Drugs		III Pos-Emotions		IV Neg-Emotions		GRSEQ total	
	N	%	*N*	%	*N*	%	*N*	%	*N*	%
Low (0–30)	86	29	70	30	86	30	82	29	93	31
Moderate (31–70)	123	41	38	16	115	40	83	29	114	39
High (71–100)	88	30	127	54	88	30	122	42	90	30

in the total GRSEQ score, χ^2 (2, N = 295) = 24.24, $p < .001$. Again, males were more likely to report having low gambling refusal self-efficacy than females.

Discriminant Validity

A discriminant function analysis was performed to determine the questionnaire's ability to classify the non-problem (i.e., community and student samples) and problem gamblers (i.e., clinical sample). When entered into the discriminant function simultaneously, the subscales of the GRSEQ significantly discriminated the non-problem gamblers from the problem gamblers, $\lambda = 0.343$, χ^2 (4, N = 234) = 245.93, $p < .0001$. Univariate analyses revealed that situations/thoughts, $\lambda = 0.405$, $F(1, 232) = 341.16$, $p < .001$, negative emotions, $\lambda = 0.452$, $F(1, 232) = 281.33$, $p < .001$, and positive emotions, $\lambda = 0.631$, $F(1, 232) = 135.42$, $p < .001$, subscales were the most reliable predictors of group membership. In particular, 89.1% of the problem gamblers and 92.2% of the non-problem gamblers would have been correctly classified based on the information from the GRSEQ subscales alone.

Pre-treatment Post-treatment Comparison

A pre- to post-treatment comparison was conducted on a subset of pathological gamblers (n = 53), who completed the GRSEQ for a second time following 6 weeks of individual cognitive-behavioural therapy. We expected that gambling refusal self-efficacy would increase from pre- to post-treatment. A series of t-tests revealed significant differences between pre-treatment and post-treatment scores on three of the GRSEQ subscales: situations/thoughts, t (53) = –8.97, $p < .001$, positive emotions, t (52) = –6.87, $p < .001$, and negative emotions, t (52) = –6.79, $p < .0001$. Post-treatment scores were found to be higher than pre-treatment scores on all subscales. The pre- to post-treatment difference for the drugs subscale, t (52) = 0.11, was not significant. There was also a significant difference between pre-treatment and post-treatment scores in the total GRSEQ score, t (52) = –10.19, $p < .001$. Again, post-treatment scores were found to be higher than pre-treatment scores.

Discussion

This study aimed to develop and validate a questionnaire which assesses gambling refusal self-efficacy in a general population sample of gamblers. The four-factor model that was identified and confirmed through a series of factor analyses reflected dimensions assessing situations and thoughts associated with gambling, the influence of drugs on gambling behaviour, positive emotions associated with gambling and negative emotions associated with gambling. Three of these factors are consistent with the apriori domains expected of the GRSEQ (influence of drugs, positive emotions and negative emotions). The other factor contains items assessing the two remaining apriori domains (situations associated with gambling and thoughts associated with gambling). This factor structure is consistent with the notion that there are categories of situations under which an individual may experience different levels of refusal self-efficacy (Marlatt 1985). It also suggests that the GRSEQ assesses important categories in regard to gambling refusal self-efficacy, as evidenced by

the substantial amount of variance accounted for by the four factors (and, in particular the first factor of Situations/Thoughts). All factors of the GRSEQ were highly correlated, and correlated with the total GRSEQ score. Future studies are needed to replicate these factors and to confirm the factor structure using a unique sample.

The level of internal consistency of the GRSEQ factors and total GRSEQ score were high. This high level of internal consistency, along with the high level of correlation between factors, suggests some redundancy in the items of the GRSEQ. However, given that all items assess the same underlying construct of gambling refusal self-efficacy it was expected that a strong level of correlation would be found. Although a strength of this study was the inclusion of a clinical sample, it appears likely that lower correlational and internal consistency scores would be found using an even larger sample of problem gamblers as the range of responses to items on the GRSEQ was considerably different amongst non-problem and problem gamblers. It was observed that a large number of respondents in the non-problem gambling sample (i.e., community and student samples) endorsed the extreme levels of confidence on majority of items. In addition, a discriminant function analysis revealed that there were significant differences between the problem and non-problem gamblers on all subscales of the GRSEQ. It is therefore possible that the large number of non-problem gamblers in this sample resulted in a lack of differentiation across items on the GRSEQ. Future studies need to determine if using a larger sample of problem-gamblers increases the heterogeneity of responses on the GRSEQ.

Preliminary examination of test retest reliability of the GRSE provided less than optimal results. This may be due in part to the extremely small sample size used for this analysis (i.e., $n = 18$). It is also likely that the low test–retest correlation is due to the length and nature of the test–retest period. In particular, a waiting-list period of 6-weeks was used between re-administration of the measure. This is longer than the test–retest period used within most studies and during this period clients were waiting to commence treatment. Such factors may increase the likelihood that individuals naturally recover, seek help from other sources or experience deterioration in their condition (Arrindell 2001). Future research could usefully examine test–retest reliability in a more standard way, by using a shorter re-administration period and by not using a clinical sample that is awaiting treatment.

As predicted, scores on the GRSEQ were associated with other instruments assessing gambling-related variables including severity of gambling problems, gambling-related cognitions and gambling urge. These results suggest that an individual's beliefs about whether or not they can resist an opportunity to gamble in a given situation influence the extent to which they experience problematic gambling behaviours, gambling-related cognitions and urges to gamble (May et al. 2003; Sylvain et al. 1997; Symes and Nicki 1997). An implication of this finding is that pathological gamblers will do better in treatment if they develop high levels of gambling refusal self-efficacy. Significant associations were also found with a questionnaire assessing symptoms of anxiety, depression and stress. Such results are consistent with research that indicates that pathological gambling is associated with negative mood states such as depression, anxiety and stress (Dickerson et al. 1991; Raylu and Oei 2002) and imply that clinical techniques designed to improve self-efficacy expectations may also be useful in reducing levels of depression, anxiety and stress. Finally, a moderate association was found with a scale assessing general self-efficacy. This result supports the prediction that the GRSEQ measures a construct that is similar, however distinct, from general self-efficacy.

Construct validity of the GRSEQ was demonstrated by the significant differences found between groups. Significant differences were found between the non-problem (i.e.,

community and student samples) and problem gamblers' (i.e., clinical sample) scores on all GRSEQ factors and the total score. In all cases, the problem gamblers were found to have lower gambling refusal self-efficacy scores than the non-problem gamblers. These results support the research suggesting that refusal self-efficacy is an important determinant in pathological gambling (May et al. 2003; Sylvain et al. 1997; Symes and Nicki 1997), although it cannot be ruled out that the differences between the problem and non-problem gamblers were not influenced by the demographic differences observed between the community, student and clinical samples. A significant gender differences was found on the positive emotions factor, negative emotions factor and total GRSEQ score. In all cases, males were found to report lower self-efficacy than women. This finding adds to the validity of the scale in that males are typically more at risk for gambling problems than females (Crisp et al. 2004). Given that refusal self-efficacy is related to gambling problems, lower refusal self-efficacy would be expected in males.

It was also shown that the GRSEQ is sensitive to changes in refusal self-efficacy after completing treatment. In particular, a pre-treatment post-treatment comparison with a subset of problem gamblers identified significant differences on the situations/thoughts, positive emotions and negative emotions factors, as well as the GRSEQ total scores. In all cases post-treatment self-efficacy scores were found to be higher than pre-treatment scores. Whilst this particular analysis was limited by a small sample size ($n = 53$) it provides further evidence that the GRSEQ may be a useful research and clinical tool, not only in assessing level of gambling refusal self-efficacy and identifying the specific circumstances related to low refusal self-efficacy, but in tracking change in gambling refusal self-efficacy across treatment.

The results presented in this study indicate that the GRSEQ provides a useful measure of gambling refusal self-efficacy in normal and clinical populations. Furthermore, the GRSEQ represents a potentially valuable tool for the clinical assessment and treatment of pathological gambling. Although these results are encouraging, limitations of the current study and directions for future research are evident. In particular, it would be useful to further examine the stability of GRSEQ factors and total score as well as its temporal stability in a larger sample that includes a higher number of pathological gamblers.

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