

## Problem Gambling in Australian PTSD Treatment-Seeking Veterans

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This study explored gambling among Australian veterans entering posttraumatic stress treatment programs ( $n = 153$ ). Twenty-eight percent reached the South Oaks Gambling Screen (SOGS) criteria for probable problem gambling, as did 17% on the *DSM-IV* gambling scale (*Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*; American Psychiatric Association, 1994). Almost all problem gamblers reported gambling to escape problems in other areas of their lives. The strongest independent predictor of problem gambling was gambling weekly or more often on electronic gaming machines. There was no significant relationship between problem gambling, posttraumatic stress disorder (PTSD), anxiety, depression, or alcohol use. The study identified an entrenched gambling culture among PTSD treatment-seeking veterans, finding these veterans indulge in many different forms of gambling and that these forms are mediated by situational factors that provide both casual and formal gambling opportunities.

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Posttraumatic stress disorder (PTSD) is associated with high levels of comorbidity including substance abuse, anxiety, depression, and personality disorders (Keane & Wolfe, 1990; O'Toole, Marshall, Schureck, & Dobson, 1998; Roszell, McFall, & Malas, 1991; Southwick, Yehuda, & Giller, 1993). There is also evidence that it is associated with problem gambling (McCormick, Taber, & Kruegelbach, 1989). A study of veterans admitted to a Veterans' Affairs hospital for substance abuse found 33% met criteria for both substance abuse and pathological gambling (Daghestani, Elenz, & Crayton, 1996); elsewhere 13% of substance abusers met criteria for probable pathological gambling (Roy, Smelson, & Lindken, 1996). These associations, however, were not confirmed in a study of PTSD comorbidities among Australian Vietnam veterans (O'Toole et al., 1998).

Some authors have suggested PTSD sufferers engage in gambling behavior as a form of self-medication to deal with overwhelming symptomatology, notably reexperiencing and hyperarousal (Daghestani et al., 1996; Rundell, Ursano, Holloway, & Silberman, 1989). The combination of PTSD and alcohol use may contribute to problematic gambling behavior through impairment of control (Baron & Dickerson, 1999; Kyngdon & Dickerson, 1999). Support for the efficacy of problem gambling behavior as self-medication, a means of escape from negative mood states, has been offered by Dickerson, Walker, Legg England, and Hinchey (1990), who reported that 79% of gamblers entering treatment stated, among other reasons, that they gambled to forget their troubles. Further, Legg England and Gotestam (1991) found problem gamblers reported loneliness, depression, or stress precipitated their gambling.

There is also a possible link between gambling and personality. Lesieur (2001) reported there were probably three personality types of problem gamblers including "normal problem gamblers," "impulsive action seekers," and "impulsive escape seekers"; the latter two groups

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exhibited specific psychopathology. Recent work suggests comorbid psychiatric disorders may be present in up to 62% of gamblers (Graham & Lowenfeld, 1986; Ibanez et al., 2001). However, the overall evidence is far from clear, primarily because the research has been unable to determine causality; it is not clear whether identified personality traits preceded and contributed to problem gambling, or followed after and resulted from the gambling experience (Murray, 1993). Consistent with this, between 10–38% of those suffering a range of psychiatric disorders have elevated gambling behavior (Lejoyeux, Arbaretaz, McLoughlin, & Ades, 2002; Lesieur & Blume, 1990; Westphal, Rush, Stevens, & Johnson, 1998). These rates can be compared with population estimates suggesting, regardless of gender, between 2–3% of the Australian adult population may have significant problems with their gambling (Productivity Commission, 1999).

Given the literature identifying a possible relationship between substance use and problematic gambling, the known association of PTSD and substance abuse, and the suggestion of a shared mechanism of self-medication underlying both substance abuse and gambling, it is important to describe actual gambling behaviors and to identify the predictors of these behaviors in veterans. This is particularly important in relation to treatment-seeking veterans with combat-related PTSD. To date, there has been little published identifying the prevalence of problem gambling behavior among those with PTSD. This study aimed to provide some information on this important topic.

## Method

### Participants

Australian veterans ( $n = 194$ ) consecutively admitted into group therapy treatment (typically 6–8 veterans/group) at Department of Veterans' Affairs-funded PTSD treatment programs were invited to participate; 153 veterans participated. A description of the treatment programs can be found in Creamer, Forbes, Biddle, and Elliot (2002). On admission, all participants completed a routine questionnaire including PTSD, alcohol, depression, and anxiety measures. A gambling activities survey was included.

### Measures

Demographic questions included gender and age, marital, employment, and pension status. Prior to admis-

sion, all veterans were clinically assessed with the Clinician Assessed PTSD Scale (CAPS; Blake et al., 1995). The clinician-rated CAPS is regarded as the "gold standard" for PTSD diagnosis (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996). All veterans in the sample met CAPS criteria for PTSD. Simple verification suggested excellent reliability properties in the study sample (Cronbach's  $\alpha = .88$ ).

To measure PTSD symptoms, respondents completed the Posttraumatic Stress Disorder Check List (PCL; Weathers, Litz, Herman, Huska, & Keane, 1993). It has been validated in PTSD treatment-seeking veterans (Forbes, Creamer & Biddle, 2001). The PCL items correspond to the *Diagnostic and Statistical Manual of Mental Disorders, Third Edition's (DSM-III)* (American Psychiatric Association [APA], 1980) detailed symptoms of PTSD (Weathers et al., 1993), and it is highly correlated with the clinician-rated CAPS (Blanchard et al., 1996; Forbes et al., 2001). A cut-off point of 50 is used to identify caseness. The reliability of the PCL in the study sample was  $\alpha = .88$ .

Alcohol use was measured by the Alcohol Use Disorders Identification Test (AUDIT), which is the World Health Organization's screening test for identifying early alcohol problems (Babor, de la Fuente, Saunders, & Grant, 1989; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). The cut-off point for problem alcohol use is 10. The reliability of the AUDIT was  $\alpha = .90$ .

To measure depression and anxiety the Hospital Anxiety and Depression Scale (HADS) was used. This comprises two scales providing incremental severity measures of emotional disorder (Snaith & Zigmond, 1994; Zigmond & Snaith, 1983). The HADS has been validated in populations similar to veterans (Hamer, Sanjeev, Butterworth, & Barczak, 1991). Cut-off points for anxiety and depression diagnoses are 11. The respective reliabilities were  $\alpha = .83$  and  $\alpha = .79$ .

The South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987) is a self-report gambling severity measure focusing on a gambler's behavior. It probes the extent to which gamblers chase losses, have problems controlling their gambling, gamble more than they intended, feel guilty about their gambling, and they believe they have a problem. A score of 5 or more indicates a probable problem gambler (Productivity Commission, 1999). The SOGS is a lifetime measure: Respondents indicate whether they have ever engaged in the endorsed behavior. The reliability of the SOGS was  $\alpha = .91$ .

The *DSM-IV* (APA, 1994) gambling scale probes the extent to which respondents experience a range of psychological, behavioural, and psychosocial features of problem gambling, including preoccupation, development

of tolerance, irritability, and gambling as an escape. A cut-off point of 5 is used to identify problem gamblers. The timeframe for the *DSM-IV* is indeterminate. Some questions relate to experiences; others probe present behaviors. The reliability of the *DSM-IV* was  $\alpha = .89$ .

The SOGS and the *DSM-IV* have four items in common. These are chasing losses, control of gambling, borrowing resources, and lying about the extent of gambling behavior.

Finally, participants were asked whether, in the last year, they had participated in any of 11 popular gambling activities and, if so, how many times per week, month, or year. The gambling activities were electronic gambling machines ("EGMs") or pokies, horses (betting on horse, harness, or greyhound races, excluding sweeps), scratch tickets (instant win scratchcards), lottery games; casino table games, keno (playing keno at a club, casino, or other place), bingo (playing at a club or hall), sports (betting on a non-horse or greyhound sporting event, e.g., football, cricket, or tennis), Internet (gambling through an Internet site), home (playing games privately for money at home or elsewhere, e.g., cards or mahjong), and "other" (participation in any other form of gambling for money).

### Data Analysis

For descriptive measures we used percentages, for categorical analyses we utilized chi-square analyses, and for continuous variables means and standard deviations are reported together with *t* tests. However, where distributional assumptions were violated medians and interquartile ranges (IQR) are reported, as are Spearman correlations and the Mann-Whitney U-test. To test between correlations we used Cohen's *q*. Exploratory factor analysis was used to group gambling variables for use in logistic regression models exploring predictors of problem gambling. For the logistic regression models we accepted the models with the smallest  $-2 \log$  likelihood ( $-2LL$ ). The results are reported as odds ratios (ORs) and 95% confidence intervals (CIs).

For intermittent missing values, the data were imputed using horizontal mean substitution, calculated from other items in the same scale. No imputation was used for monotone missing data. After imputation, the level of missing data varied from 3–13%.

The test-size statistic was the conventional  $\alpha = .05$ . Where the results were between  $\alpha = .05$ –.10 we have described these as being suggestive. Data were analyzed using SPSS, Version 11.5 (SPSS, 2003).

## Results

### Participants

The response rate was 79%. All participants were male, their mean age was 54.4 years ( $SD = 4.9$ ), 74% were in a steady relationship (70% married, 4% de facto) and their mean CAPS on intake was 86.7 ( $SD = 15.6$ ). Seventy percent were clinically diagnosed with a depressive disorder, 45% with an anxiety disorder other than PTSD, and 65% with an alcohol use disorder.

Eighty-four percent reported participating in at least one form of gambling over the past year, compared with 82% for the Australian population age cohort (50–64; no gender differences were reported) during the 1997/1998 financial year (the last year for which national figures are available; Productivity Commission, 1999).

### Gambling Behavior

Table 1 shows the proportion of veterans gambling on each type of activity. The most popular forms of gambling among veterans were lotto, scratch tickets, EGMs, horses, and keno (in order). The least popular forms were bingo, "other," home, sport, and casino. Given only three participants reported playing bingo, these were combined into the "other" category. Because no veteran indicated gambling on the Internet, this category was excluded from the data analysis. As shown, the chi-square analysis indicated that the differences by type of gambling were significant.

Table 1 also reports Australian gambling norms. Veterans, when compared with the Australian population generally, were 4 times more likely to gamble on keno (OR: 3.99), twice as likely to gamble on lotto (OR: 2.02), 76% more likely to gamble on EGMs (OR: 1.76), 73% more likely to gamble on the horses (OR: 1.73) and 53% more likely to gamble using scratch tickets (OR: 1.53). For all other gambling activities, there were no significant differences between veterans and the Australian population.

When the frequency of each gambling activity was assessed, the data were so badly skewed that each was recoded into four levels (did not gamble, gambled monthly or less, gambled less often than weekly, and gambled weekly or more often). The results show the most common gambling activities were lotto (51% = weekly or more often), EGMs (29% = weekly or more often), scratch tickets (26% = weekly or more often), horses (16% = weekly or more often), and keno (10% = weekly or more often).

Posttraumatic stress disorder, comorbidities, and reported gambling behaviors were correlated with the SOGS

**Table 1.** Gambling Characteristics Compared With Australian Population Norms

Type of gambling	Numbers (%)						Statistics <sup>b</sup>	
	Veterans		Australian population <sup>a</sup>					
	Yes	No	Yes	No	Yes	No	OR	95% CIs
	<i>N</i>	(%)	<i>N</i>	<i>N</i>	(%)	<i>N</i>		
Lotto	114	(75)	39	6300	(60)	4200	2.02	1.33–2.86
Scratchtickets	88	(58)	65	4935	(47)	5565	1.53	1.09–2.13
EGM	81	(53)	72	4095	(39)	6405	1.76	1.26–2.45
Horses	56	(37)	97	2625	(25)	7875	1.73	1.23–2.44
Keno	47	(31)	106	1680	(16)	8820	3.99	2.77–5.73
Casino	14	(9)	139	1050	(1)	9450	0.91	0.50–1.61
Sport	11	(7)	142	630	(0.6)	9870	1.21	0.62–2.32
Home	10	(7)	143	525	(0.5)	9975	1.33	0.66–2.61
Bingo <sup>c</sup>	3	(2)	150	525	(0.5)	9975	0.38	0.10–1.23
Internet <sup>d</sup>	0		0	420	(0.4)	10080		
Other <sup>c</sup>	6	(4)	147	N/A	N/A			

<sup>a</sup>Calculated from Productivity Commission data (1999). <sup>b</sup>Compares the relative frequency of gambling on each activity for veterans compared with the Australian population. <sup>c</sup>Cells combined during data analysis. <sup>d</sup>Excluded from chi-square analysis.

and *DSM-IV* (Table 2). No significant correlations between PTSD (PCL;  $M = 67.3$ ,  $SD = 9.6$ , range = 34–84), anxiety (HADS;  $M = 14.5$ ,  $SD = 3.6$ , range = 1–21), depression (HADS;  $M = 11.8$ ,  $SD = 4.1$ , range = 3–21) or alcohol consumption (AUDIT;  $M = 15.6$ ,  $SD = 10.1$ , range = 0–36) and the SOGS or *DSM-IV* scores were observed. There were significant but moderate correlations between the SOGS and all forms of gambling, with the exception of sport and other forms. For the *DSM-IV*,

there was a similar pattern, although sport and gambling at home were not significantly correlated.

To explore these relationships further, an overall gambling activity indicator (GAI) was constructed by adding together all the activity frequencies. This gave a composite scale with a range from 0 to 27, where higher scores represented greater gambling activity. The GAI was highly skewed, the range of scores being 0 to 17 and the median 5.00 (IQR = 7.00). When we correlated the GAI with the two problem gambling scales, the Spearman correlations were  $r_{\text{SOGS}} = .63$  ( $p < .01$ ) and  $r_{\text{DSM-IV}} = .57$  ( $p < .01$ ). This difference in correlations was not significant (Cohen's  $q = 0.09$ ,  $p = .24$ ). That these correlations were higher than for any individual gambling measure, other than EGM gambling, suggests the SOGS and *DSM-IV* scores reflect multiple gambling behaviors. To verify this, gambling behaviors were dichotomously coded (did not gamble/gambled more than weekly). The results showed 60% of participants gambled more than once per week. They also showed 22% participated in one type of gambling more than once per week, 14% participated in two types, 16% in three types, 6% in four types, and 2% in five types of gambling more than once per week per type.

The SOGS and *DSM-IV* scores were badly skewed. For the SOGS, the median score was 1.00 (range = 0–16; IQR = 6.00) and for the *DSM-IV* it was 0.00 (range = 0.10; IQR = 3). The correlation between the SOGS and *DSM-IV* was Spearman  $r = .87$ , suggesting they were measuring the same thing. However, when the two measures were dichotomized at the cut-off points for probable problem gambling the SOGS classified 41 cases (29%) compared

**Table 2.** Spearman Correlations Between Gambling Activities, PTSD Comorbidities, and Problem Gambling Scales

		SOGS	<i>DSM-IV</i>
		<i>r</i>	<i>r</i>
Comorbidities	HADS	-.05	-.11
	Anxiety		
	HADS	-.02	<.01
	Depression		
	AUDIT	.12	.13
Gambling activities <sup>a</sup>	PCL	.10	.05
	Lotto	.37**	.32**
	EGM	.58**	.60**
	Scratchtickets	.36**	.29**
	Horses	.40**	.44**
	keno	.27**	.21**
	Casino	.28**	.23**
	Sport	.16	.07
	Home	.24**	.14
	Other	.20*	.18*

<sup>a</sup>Actives have been recoded (*did not gamble, gambled monthly or less, gambled less often than weekly, gambled weekly or more often*) to overcome distributional difficulties.

\* $p < .05$ . \*\* $p < .001$ .

with 24 (17%) on the *DSM-IV*. Twelve cases were missing. Crosstabulation showed (a) there was agreement on 102 cases having no evidence of problem gambling; (b) 0 cases were identified by the *DSM-IV* but not by the SOGS; (c) 15 cases were identified by the SOGS but not the *DSM-IV*; and (d) there was agreement on 24 identified cases. These differences were statistically significant,  $\chi^2(1, N = 141) = 75.65, p < .01$ .

When the GAI measure was analyzed by caseness using the dichotomized SOGS and DSM, the results showed that for the SOGS the median GAI score for noncases was 4.00 (IQR = 6.00) compared with 10.00 (IQR = 6.00) for cases ( $U = 777.00, p < .01$ ). For the *DSM-IV* the median scores were 5.00 (IQR = 7.00) and 11 (IQR = 3.75), respectively ( $U = 520.00, p < .01$ ). Thus, despite the high correlation between the SOGS and *DSM-IV* there were significant differences in case classification.

Based on the same criteria used in this study and using the tables in the Australian Productivity Commission (1999) report, the population problem gambling prevalence rate for those aged 50–64 was calculated at 6.1%. When the study estimates were compared with this population estimate, the ORs indicated treatment-seeking veterans were between 34 to 64 times more likely to be problem gamblers than the similar aged population cohort (OR<sub>SOGS</sub>: 64.37; 95% CI: 33.46–125.35; OR<sub>DSM-IV</sub>: 33.71; 95% CI: 16.60–68.70).

### Predicting Problem Gambling

Gamblers often indulge in more than one form of gambling and this was investigated. Given the limitations of sample size, the multicollinearity of types (many gambling activities were highly related) and the restricted numbers participating in many of the gambling activities, we used exploratory factor analysis with a varimax rotation to group gambling activities, and logistic regression to predict gambling behavior. To overcome distributional difficulties, lotto, EGM, and scratch tickets were tertiled (did not gamble/gambled less than weekly/gambled weekly or more), while all other gambling activities were dichotomized (did not gamble/gambled). Demographic predictors included in the logistic regression model were age, marital (partnered/living alone) and work status (working/not working). Comorbidities were anxiety (HADS anxiety), depression (HADS depression), and alcohol use (AUDIT). Demographic and comorbid variables were entered into logistic regression models predicting the likelihood of being a problem gambler according to the SOGS or *DSM-IV* measures.

The exploratory factor analysis (EFA) grouped the gambling behaviors into three factors. Factor 1 comprised

scratch tickets (loading value = .80), lotto (.78), EGM (.65), keno (.53), and horse gambling (.42). Factor 2 comprised gambling at home (.81), at the casino (.78) and other forms of gambling (.64). Factor 3 comprised gambling on sport only (.87). The average on-factor loading was .70 compared with .14 for off-factor loading (including cross-loading). The model explained 57% of the variance.

For the first logistic regression models, the only significant demographic or comorbid predictor of SOGS and *DSM-IV* problem gambling status was marital status. Those living alone were 1.9 times more likely to be classified as problem gamblers on the SOGS (OR: 1.88; 95% CI: 1.22–2.90), and 2.5 times more likely on the *DSM-IV* (OR: 2.52, 95% CI: 1.47–4.30). Gambling variables from Factors 1 and 2 were then iteratively entered into the logistic regression models until the most parsimonious models were obtained.

The most parsimonious logistic regression models are shown in Table 3. The significant predictors of problem gambling as classified by the SOGS were playing EGMs more than weekly (OR: 3.08), gambling at casino tables (OR: 2.69), and living alone (OR: 1.74). For the *DSM-IV* the significant predictors were playing EGMs more than weekly (OR: 4.99) and living alone (OR: 2.39).

Posttraumatic stress disorder as a predictor of problem gambling was entered into the models, where PTSD scores were tertiled and then dichotomized at the 2nd tertile. This identified those falling into the worst third of PCL scores. The inclusion of PCL classification made almost no difference to the results presented in Table 3. For the SOGS, the  $-2LL$  changed by +0.05 and  $-0.98$  for the *DSM-IV*. The odds ratios for EGM changed marginally for those who gambled more than once a week (OR<sub>SOGS</sub>: 3.09; OR<sub>DSM-IV</sub>: 5.28), for casino gambling there was almost no effect whatsoever (OR<sub>SOGS</sub>: 2.66; OR<sub>DSM-IV</sub>: 1.68), a situation replicated for those living alone (OR<sub>SOGS</sub>: 1.70; OR<sub>DSM-IV</sub>: 2.39). The PCL was not a significant predictor. For the SOGS the OR was 1.10 (95% CI: 0.70–1.73) and for the *DSM-IV* it was 1.38 (95% CI: 0.77–2.50).

To explore whether study participants might be gambling as a method of escaping symptomatology (as suggested in the literature) we examined Question 5 in the *DSM-IV* (APA, 1994, p. 618). This asks whether the respondent gambles to escape from problems or to relieve a dysphoric mood (e.g., feelings of helplessness, guilt, anxiety, depression). Thirty-four percent ( $n = 49$ ) of study participants endorsed this item. Those who endorsed this item were 23 times more likely to be classified as probable problem gamblers on the SOGS (OR: 23.03, 95% CI: 8.48–64.60) and for the *DSM-IV*, all 24 veterans classified as problem gamblers endorsed this item.

Table 3. Predicting Problem Gambling Status

Measure	Predictors	Level	N	OR	95% CI	Model statistics		
						$\beta$ constant	-2LL	% correct
SOGS	EGM	Did not	62					
		<Weekly	33	0.87	0.45-1.68			
		$\geq$ Weekly	37	3.08	1.68-5.63			
	Casino	Did not	119					
		Gambled	13	2.69	1.34-5.39			
		Marital status	Partnered	95				
	Living alone	37	1.74	1.11-2.75	0.14	125.74	80	
DSM-IV	EGM	Did not	59					
		<Weekly	31	1.33	0.48-3.70			
		$\geq$ Weekly	39	4.99	2.02-12.35			
	Casino	Did not	116					
		Gambled	13	1.61	0.73-3.55			
		Marital status	Partnered	95				
	Living alone	34	2.39	1.36-4.19	-1.53	78.05	87	

Note. -2LL = -2 log likelihood.

### Study Generalizability

Finally, regarding generalizability, the demographic characteristics of the study participants were compared with the general population of PTSD treatment-seeking veterans who had completed similar PTSD treatment programs across Australia ( $n = 2,358$ ). There were no significant differences on the measures of: PTSD (PCL),  $t(2509) = 0.12$ ,  $ns$ ; anxiety (HADS),  $t(2509) = 1.03$ ,  $ns$ ; depression (HADS),  $t(2509) = 0.30$ ,  $ns$ ; or alcohol use (AUDIT),  $t(2509) = 0.55$ ,  $ns$ . Study participants were slightly older; their mean age was 54.4 years ( $SD = 4.9$ ) compared with 52.2 years ( $SD = 5.4$ ) for the PTSD treatment-seeking population,  $t = 4.91$ ,  $p < .01$ . Given this difference is less than two years, its impact is probably limited.

### Discussion

Little is known about gambling in veterans with PTSD beyond the anecdotal perception that it is widespread. This study investigated gambling among PTSD treatment-seeking veterans and found considerable support for this anecdotal evidence.

The proportion of veterans who reported gambling activity in the past year was similar to the general community (84% vs. 82%, respectively). However, when the type of gambling was examined the data showed study participants were twice as likely to gamble on lotto, 50% more likely to gamble with scratch tickets, over 70% more likely to gamble on both EGMs and horses, and 4 times more likely to gamble on keno (Table 1). Further, when gambling frequency was examined, 51% reported gam-

bling on lotto weekly or more often, as did 29% for EGMs, 16% for scratch tickets, and 10% for horses. When a GAI was computed by summing the frequencies across gambling types, the results showed 22% of participants gambled on one type of gambling weekly or more often, as did 38% on two or more different types of gambling.

Twenty-nine percent of study participants was classified as probable problem gamblers according to the SOGS and 17% as such on the DSM-IV. Given the SOGS reports lifetime prevalence, the upper estimate here should be interpreted as lifetime gambling prevalence; the lower estimate from the DSM-IV is likely to be a more accurate estimate of current gambling activity because the DSM-IV has no time frame and several of the items are written in the present tense. Even with this caveat, the elevated probable problem gambling level is indicative of a major gambling problem. This is consistent with gambling levels reported in a study of American veterans hospitalized for substance abuse (Daghestani et al., 1996) and with other reports of elevated gambling among those with psychiatric illness (Lejoyeux et al., 2002; Lesieur & Blume, 1990; Westphal et al., 1998).

In seeking to explain gambling behavior, Lesieur (2001) identified three types of problem gamblers one of which was "impulse escape gamblers." Question 5 in the DSM-IV (APA, 1994, p. 618) probes this, and veterans who endorsed this item were 23 times more likely to be classified as a probable problem gambler on the SOGS and for the DSM-IV, all 24 of the problem gamblers endorsed this item. This suggests a key reason for gambling among PTSD treatment-seeking veterans is to escape problems or relieve dysphoric moods.

The study findings suggest a strong culture of gambling among PTSD treatment-seeking veterans, possibly driven by the need to escape other problems in their lives. Although some may perceive the study findings to overstate the gambling situation among PTSD treatment-seeking veterans, the findings should be interpreted in light of known difficulties with gambling questionnaires. Problem gamblers are likely to refuse to participate in gambling studies because they are unwilling to answer potentially embarrassing questions (Shaffer, Hall, & Vander Bilt, 1997) and are likely to conceal their true behavior. For example, the Productivity Commission (1999) surveyed 401 clients of counseling agencies across Australia. The surveyed clients reported that if asked to complete the survey prior to entering treatment, 14% of them stated they would have concealed at least some of their problems, 19% reported they would have mostly or completely concealed any problems, and a further 24% indicated they would have refused to participate outright. Given the response rate to this study was 79% it is likely, in view of the literature, the results actually understate gambling behavior among PTSD treatment-seeking veterans.

When gambling behavior was explored in detail based on the EFA results, the data suggested there were two underlying factors. Factor 1 (the pivotal items were scratch tickets, lotto, keno, EGMs, and gambling on horses) represented gambling activities a person could do alone or casually, perhaps through a newsagent when purchasing papers or magazines (e.g., scratch tickets or lotto) or at a hotel or club where the gambling opportunity was close to the bar (e.g., keno or EGMs). Factor 2 represented more social gambling—where others were involved—and the gambling event needed to be organized (gambling at home and at tables in a casino). Both factors imply that situational circumstances mediate the type and frequency of gambling behavior.

For the SOGS, the findings showed that those who gambled on EGMs weekly or more often, those who gambled at tables in casinos, and those who lived alone were more likely to be classified as problem gamblers. For the *DSM-IV* the results were similar, although gambling at a casino was not significant. Of interest are the different odds ratios for weekly EGM gambling, 3.08 for the SOGS compared with 4.99 for the *DSM-IV*. Given the two measures share measurement of several constructs, the high correlation was not surprising (Spearman  $r = 0.87$ ). The different ORs, however, suggest the two instruments are differentially sensitive. This may be due to the different time frame assessed by the two instruments. As indicated earlier, the SOGS is a lifetime measure while the *DSM-IV* uses a current time frame.

The preeminent role of EGM gambling is because of situational factors, particularly accessibility. In all Australian states, except Western Australia, EGMs are widely available, located in hotels and clubs throughout metropolitan and country areas. Often EGMs are situated in a prominent area, visible from the bar and restaurant. Given 82% of the sample were unemployed and 65% were in receipt of a Department of Veterans Affairs (DVA) funded pension it may be that individuals had both time and opportunity to indulge in the most accessible form of gambling activity. This situational proximity may also explain the extraordinarily high level of keno gambling, which is offered at the bar of many hotels and clubs.

There was no significant association between the HADS anxiety, HADS depression, the AUDIT, PCL scores, and the two gambling measures; this was unexpected because the literature suggests a correlation between psychiatric symptomatology and problem gambling (Daghestani et al., 1996; Ibanez et al., 2001; Lejoyeux et al., 2002; Lesieur & Blume, 1990; Lesieur, 2001; McCormick et al., 1989; Roy et al., 1996; Westphal et al., 1998). This finding was consistent with those of O'Toole et al. (1998), although they offered no suggestions explaining this lack of relationship. One possible explanation is that although there was a broad range of self-report PTSD (PCL) scores (range: 34–84), participating veterans were all suffering the same condition, PTSD. Correlation analyses perform poorly in homogenous groups. It may be that within a sample with a variety of conditions a relationship between problem gambling and symptom severity would emerge. In addition, study veterans displayed multiple psychiatric symptomatology, which may have masked the effects of single measures of psychiatric symptomatology.

The findings suggested gambling behaviors were mediated by situational factors (which provide the opportunity) more than the underlying emotional and social factors (e.g., depression and anxiety that provide the motivation). Importantly, participants who were classified as problem gamblers reported they gambled to escape problems in other areas of their life. While not assessed in this particular study, the literature suggests there may be other emotional and social factors, which play a part in the acquisition and maintenance of problem gambling behavior, including erroneous beliefs, personal skill, special knowledge, superstition, and the gambler's fallacy (Murray, 1993; Sharpe & Tarrier, 1993). Given the study findings, further research among veterans into the relationship between the contribution of situational, emotional, and social factors to problem gambling behavior is warranted.

The sample was a convenience sample of PTSD treatment-seeking veterans. The results are therefore subject to all the limitations associated with nonprobability sampling. However, when the demographic characteristics of study participants were compared with the general population of PTSD treatment-seeking veterans who had completed similar PTSD treatment programs across Australia ( $n = 2,358$ ), the data showed there were no significant differences. On balance, it is likely the study findings are generalizable to the broader PTSD treatment-seeking population.

A second caveat is in relation to the data analysis models. Because of the sample size, the data were simplified to avoid violating statistical assumptions. Although the logistic regression model was interpreted as a predictive model, the data were cross-sectional. We think, however, the predictive interpretation is justified because it is unreasonable to assume that problem gambling precedes gambling behavior itself.

## Conclusion

The prevalence of gambling among PTSD treatment-seeking veterans was found to be much higher than in the general Australian community. The proportion of problem gamblers was between 17–29% compared with 3% for the Australian community generally; study participants were between 34 to 64 times more likely to be problem gamblers when compared with the appropriate Australian age-group. A key reason for gambling was to escape other problems in their lives. The key predictors of problem gambling were gambling on EGMs weekly or more often, gambling at casino tables, and living alone. Although no support for a relationship between PTSD, anxiety, depression or alcohol use was observed, this may be due both to the fact that all study participants were diagnosed with PTSD and there was multiple psychiatric symptomatology within the sample.

Subject to the caveats, this study identified a gambling culture among Australian PTSD treatment-seeking veterans that has not been previously reported. The findings suggest veterans indulge in many different forms of gambling and these forms are mediated by situational factors that provide both casual and formal gambling opportunities. Given the proportion of problem gamblers and the extent of the gambling culture, further research aimed at providing appropriate treatment and ameliorating the gambling culture among veterans with PTSD seems warranted.

## Acknowledgments

The authors would like to acknowledge the assistance of staff and veterans from the PTSD treatment programs around Australia for providing the data used in this paper. Ethics approval for data collection was granted by the Department of Veterans' Affairs Human Research Ethics Committee and the study was funded through block grants from the Department of Veterans' Affairs.

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