Lifetime Prevalence of Pathological Gambling Among American Indian and Hispanic American Veterans

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Objectives. We examined the prevalence and clinical correlates of pathological gambling among 1228 American Indian and Hispanic American veterans in the southwest and north central regions of the United States.

Methods. We surveyed a community sample of American Indian and Hispanic American veterans to obtain data on psychiatric disorder and treatment.

Results. American Indian veterans had a 10% lifetime prevalence of pathological gambling. The Hispanic American lifetime prevalence was less than that of the American Indian veterans but higher than the prevalence found for Hispanic American veterans in other surveys. Comorbid conditions associated with pathological gambling included substance, mood, and antisocial personality disorders. Ready access to casino gambling may encourage, support, or contribute to high rates of pathological gambling in both men and women.

Conclusions. A 70% lifetime comorbidity of psychiatric disorders suggests that early interventions for pathological gambling should consider common psychiatric conditions rather than focusing on pathological gambling alone. (*Am J Public Health.* 2005;95:860–866. doi:10.2105/AJPH.2003.023770)

Community surveys have shown that adult lifetime prevalence rates of pathological gambling range from 0.9% to 3.4%.[1] A Minnesota study conducted in 1990, before casino gambling was available, revealed a lifetime prevalence rate of 1.0% among adults.[2,3] Studies in Maryland, New Jersey, and Ohio have demonstrated rates of 1.2% to 3.4%.[4–6] Higher rates have been found among special subgroups; for example, 5.0% of 754 French Canadian male youths aged 17 years had "high problem" gambling according to the South Oaks Gambling Screen for Adolescents (SOGS/A), which has high sensitivity.[7] The SOGS/A indicated that 5.8% of 12 066 Louisiana preteens and teenagers reported "high problem" gambling in the past year.[8] A rural Minnesota telephone survey of 119 American Indian adults revealed a 2.8% lifetime rate of pathological gambling,[9] significantly higher than the 1.6% rate among 102 local non–American Indian adults. And a North Dakota telephone survey found a 7.1% lifetime rate among American Indian adults, compared with a rate of 2.5% among US adults.[10]

Knowledge regarding psychiatric disorders comorbid with pathological gambling has come from clinical studies in patients with pathological gambling,[11–16] substance use disorders,[11,17,18] and other disorders.[19,20] These studies have suggested that substance use disorder and mood disorders co-occur with pathological gambling more often than can be explained by chance.

This community survey of American Indian and Hispanic American (hereafter Hispanic) veterans was undertaken to study barriers to VA mental health service associated with specific psychiatric disorders.[21,22] Because data on pathological gambling were obtained, we were able to ascertain prevalence rates and comorbidity. We used these data to test the following hypotheses:

- American Indian veterans have a higher lifetime prevalence of pathological gambling than do Hispanic veterans owing to higher exposure to legal gambling in American Indian communities (a hypothesis based on Volberg and Abbott[6,10]).
- Men have a higher rate of pathological gambling than do women (a hypothesis based on 2 clinical studies,[11,23] a self-selected community sample,[24] and 2 epidemiological studies[1,5]).
- Comorbid substance use, mood, and antisocial personality disorders, but not anxiety disorder, are more common among veterans with pathological gambling than among veterans without pathological gambling (a hypothesis based on clinical observations[15,25] and a community survey[1]).

METHODS

Sample

This community-based survey included 1624 American Indian and Hispanic veterans from the southwest region (predominantly New Mexico) and the north central region (predominantly Minnesota). The largest tribal groups were the Tiwa-Tewa (Pueblo) and Dene (Navaho) in the southwest region and the Anishinabe (Ojibway or Chippewa) and Dakota-Lakota (Sioux) in the north central region. Two thirds of Hispanic veterans identified themselves as Mexican Americans in both regions. Most southwest Hispanic veterans came from the region, whereas most north central Hispanic veterans had migrated to the region. Targeted sampling consisted of selection of groups and communities in which veterans could be identified, contacted, and invited to participate in the study. Researchers remained in the community until all willing veterans could participate in the study at their convenience. Among 3 groups in which the total number of veterans was known (n=57), 53 veterans (93%) volunteered for the study.

The sample was structured to include 50% urban and 50% rural veterans. On the basis of census maps, we chose counties and communities in which we could expect to interview 10 or more veterans. Rural American Indian communities consisted of reservation villages, and rural Hispanic communities consisted of villages, towns, or neighborhoods with predominantly Hispanic populations. In urban settings, sampling was primarily accomplished through group affiliation (e.g., veterans' groups, churches, schools, ethnic associations).

Interview sites included the veteran's residence (n=515, 32%), a VA clinical facility (396, 24%), a community setting or institu-

tion (338, 21%), a reservation/tribal office (178, 11%), pow-wow (129, 8%), and miscellaneous sites (69, 4%). Only American Indian veterans chose reservation/tribal office and pow-wow (researchers received permission from sponsoring organizations to set up booths at these frequently occurring gatherings) as interview locations; Hispanic veterans were more likely to select a parish church or social organization for interviews.

Veterans interviewed in VA facilities (n=396, 24%) had high rates of lifetime *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (*DSM-IV*)[26] Axis I disorder (63.6% vs 48.4% for the other sites), schizophrenia (7.8% vs 2.8% for the other sites), and manic episode (8.6% vs 2.8% for the other sites). Thus, they resembled a clinical sample rather than a community sample and, accordingly, they were dropped from the analysis, leaving 1228 veterans.

At the time of the study, gambling casinos had been present for about 10 years. Casinos were located on numerous American Indian reservations and on the outskirts of the urban areas in both regions. Some Hispanic rural communities were located near casinos, but others were as much as 200 miles away.

The north central sample included more American Indian veterans (518 of 780 veterans [66.4%]), and the southwest sample included more Hispanic veterans (248 of 448 veterans [55.4%]). The total sample contained more American Indian than Hispanic veterans (718 vs 510) and more north central than southwest veterans (780 vs 448). These discrepancies resulted from greater numbers of Hispanic communities in the southwest and greater ease of access to the large number of American Indian communities in the north central region.

Data Collection

Veterans completed the instruments in English, with translation and explanation provided as needed by research assistants who spoke their language and were either veterans or relatives of veterans. All veterans were sufficiently fluent in English to complete the protocol; a small number requested help with specific words or phrases.

Participants completed a demographic questionnaire (Table 1), then a computer-based algorithmic diagnostic program, the Quick–Diagnostic Interview Schedule (Q-DIS), which provides *DSM-IV* Axis I psychiatric diagnoses and 1 Axis II diagnosis (antisocial personality disorder).[26] The Q-DIS collects information about the number of lifetime gambling problems and lifetime diagnosis of pathological gambling. *DSM-IV* criteria for pathological gambling, which require a minimum of 5 of a possible 10 symptoms, are both reliable and valid.[27] (Detailed response data available from the author.)

We used 3 self-rated symptom scales as a reliability measure for the diagnoses. The self-rated 57-item Brief Symptom Index (BSI-57) contains items selected from the 90-item Symptom Checklist, with subscales for somatization, interpersonal sensitivity, depression, anxiety, hostility, and phobic anxiety; time frame is for current symptoms.[28] The self-rated Michigan Assessment–Screening Test/Alcohol–Drug (MAST/AD) consists of 25 items collecting information on excessive substance use, associated social problems, and biomedical complications; time frame is for lifetime symptoms.[29,30] The self-rated Posttraumatic Stress Checklist (PCL) is a 17-item symptom checklist with subscales for the intrusive, avoidant, and hypervigilant symptoms associated with posttraumatic stress disorder (PTSD); time frame is the past 30 days.[31]

Statistical Analysis

Comparison of veterans with and without pathological gambling was performed with the following statistical measures: χ^2 test (with correction for continuity in 2×2 tables) and Fisher exact test (if any cell had <5 veterans expected) for categorical data (2-tailed) and Mann–Whitney test for nonparametric continuous data (2-tailed). Because of the large sample size, the level of significance was set at .005. Missing data were excluded from the statistical analyses. Multivariate analyses were performed by means of a binary logistic regression on variables that were found to be significant in the univariate analysis at .001; this analysis involved a forward conditional entry model, using the Wald statistic. Entry probability was set at .05, and removal at .10.

RESULTS

Prevalence Rate

Region showed no effect on the prevalence of pathological gambling. Pathological gambling rates were 7.6% for all veterans in both regions (34 of 448 in the southwest region and 59 of 780 in the north central region) (Table 1).

Rates of pathological gambling differed by ethnicity ($P<.001$), with lifetime prevalence more than twice as high among American Indian veterans (9.9%) as among Hispanic veterans (4.3%). In light of this difference, we conducted an additional analysis (with symmetric measures of ethnicity×site×lifetime pathological gambling). This analysis showed no difference in the American Indian or Hispanic rates of pathological gambling across the 2 regions. American Indian rates of pathological gambling were 10.0% among 200 southwest American Indian veterans vs 9.8% among 518 north central American Indian veterans ($\chi^2=0.000$, 1 *df*, $P=1.00$). Hispanic rates were 5.6% among 248 southwest Hispanic veterans vs 3.1% among 262 north central Hispanic veterans ($\chi^2=1.493$, 1 *df*, $P=.22$).

Gender rates did not differ within each ethnic group. American Indian rates were 9.4% among 628 American Indian men vs 13.3% among 90 American Indian women ($\chi^2=0.964$, 1 *df*, $P=.33$). Hispanic rates were 4.2% among 475 Hispanic men vs 5.7% among 35 Hispanic women (Fisher exact test=0.657, $P=.46$). The number of Hispanic women was small, such that an addition of even 2 or 3 female veterans to the opposite category would have caused a large effect on the women's rate of pathological gambling.

Other Demographic Characteristics

Mean age did not differ between the 2 groups. However, when age was measured in deciles, we found a significant difference ($P<.005$), with the highest rates of pathological gambling observed among veterans in their 40s and the lowest rates observed in the youngest and oldest groups. No veterans younger than 24 years or older than 75 years met criteria for pathological gambling.

No significant differences were observed for the remaining demographic variables—

TABLE 1—Lifetime Pathological Gambling, by Demographic and Clinical Characteristics[a]

	Lifetime Pathological Gambling		
	Absent (n = 1135)	Present (n = 93)	Statistics
Demographic characteristics			
US geographic region, no. (%)			$\chi^2 = 0.000$; $P = 1.00$
Southwest	414 (92)	34 (8)	
North central	721 (92)	59 (8)	
Ethnicity, no. (%)			$\chi^2 = 12.455$; $P < .001$
American Indian	647 (90)	71 (10)	
Hispanic American	488 (96)	22 (4)	
Gender, no. (%)			$\chi^2 = 1.237$; $P = .28$
Male	924 (92)	79 (8)	
Female	111 (89)	14 (11)	
Age, y, mean (SD)	47.2 (14.2)	48.5 (10.3)	$Z = 1.625$; $P = .10$
Age by deciles, y			$\chi^2_4 = 14.763$; $P < .005$
20–29	111 (97)	4 (3)	
30–39	268 (96)	12 (4)	
40–49	301 (89)	37 (11)	
50–59	214 (91)	21 (9)	
≥60	216 (94)	13 (6)	
Missing data	25	6	
Education, no. (%)			$\chi^2_3 = 4.895$; $P = .18$
Not a high school graduate	329 (94)	21 (6)	
High school graduate	335 (94)	21 (6)	
High school + some college	323 (91)	34 (9)	
College graduate	126 (91)	12 (9)	
Missing data	22	5	
Marital status, no. (%)			$\chi^2_2 = 0.454$; $P = .80$
Single	347 (93)	25 (7)	
Married, common law	406 (93)	31 (7)	
Separated/divorced/widowed	359 (92)	31 (8)	
Missing data	23	6	
Employment status, no. (%)			$\chi^2_4 = 4.593$; $P = .33$
Full-time	360 (92)	32 (8)	
Part-time, episodic	155 (93)	12 (7)	
Student, parent, retired	202 (95)	11 (5)	
Disabled	139 (90)	16 (10)	
Unemployed	263 (94)	17 (6)	
Missing data	16	5	
Residence, no. (%)			$\chi^2_4 = 3.365$; $P = .50$
Family	604 (92)	50 (8)	
Friend	123 (95)	7 (5)	
Alone	274 (92)	23 (8)	
Institution[b]	29 (100)	0 (0)	
Homeless	87 (92)	8 (8)	
Missing data	16	5	
Rural/urban residence, no. (%)			$\chi^2 = 0.000$; $P = 1.00$
Rural	556 (93)	43 (7)	
Urban	518 (93)	40 (7)	
Missing data	61	10	

Continued

education, marital status, employment status, social characteristics of residence (living with family or with friends, alone), rural vs urban residence, and combat status while in the military.

Lifetime Psychiatric Diagnoses

Comparisons for lifetime diagnoses included the diagnostic categories of (1) any Axis I disorder (excluding pathological gambling), (2) any substance use disorder (alcohol or drug, abuse or dependence), (3) any anxiety disorder (i.e., panic, phobia, generalized anxiety, obsessive-compulsive, or posttraumatic stress disorder,), and (4) any affective disorder (i.e., major depression, manic episode, dysthymia).

All disorders were reported significantly more often among those with lifetime pathological gambling than among those without problem gambling ($P<.001$). Veterans with any of these disorders were 2 to 3 times more likely than those with none of these disorders to report pathological gambling.

PTSD, one of the anxiety disorders, was reported frequently, warranting a special comparison. PTSD was highly associated with pathological gambling ($P<.001$).

Antisocial personality disorder, an Axis II personality disorder, was also highly associated with pathological gambling. The χ^2 score for this disorder was highest among all comparisons of diagnostic combinations, although the lifetime prevalence rate was lower than that of any of the Axis I conditions.

Self-Rated Scales

The BSI-57 revealed higher symptom levels among veterans with lifetime pathological gambling than among those without pathological gambling ($P<.001$). Scores for each of the 6 subscales (Somatization, Interpersonal Sensitivity, Depression, Anxiety, Hostility, and Phobic Anxiety) were also elevated among these veterans ($P<.001$ for each).

The MAST/AD, a lifetime scale, showed a significantly higher frequency of alcohol/drug problems among veterans with lifetime pathological gambling ($P<.001$).

The PCL scales showed more posttraumatic symptoms among those with pathological gambling ($P<.001$). High scores in the PCL subscales consisting of re-experiencing/intrusive, avoidant/numbing, and hypervigilant/arousal

TABLE 1—*Continued*

Combat status, no. (%)			$\chi^2 = 0.925$; $P = .34$
Absent	828 (93)	30 (9)	
Present	307 (91)	63 (7)	
Lifetime psychiatric diagnoses			
Any other Axis I disorder, no. (%)			$\chi^2 = 27.820$; $P < .001$
Absent	610 (96)	23 (4)	
Present	525 (88)	70 (12)	
Any substance disorder, no. (%)			$\chi^2 = 22.782$; $P < .001$
Absent	761 (95)	39 (5)	
Present	374 (87)	54 (13)	
Any anxiety disorder, no. (%)			$\chi^2 = 17.392$; $P < .001$
Absent	844 (94)	50 (6)	
Present	291 (87)	43 (13)	
Any mood disorder, no. (%)			$\chi^2 = 22.789$; $P < .001$
Absent	1014 (94)	67 (6)	
Present	121 (82)	26 (18)	
Posttraumatic stress disorder, no. (%)			$\chi^2 = 22.862$; $P < .001$
Absent	999 (94)	65 (6)	
Present	136 (83)	28 (17)	
Antisocial personality disorder, no. (%)			$\chi^2 = 40.119$; $P < .001$
Absent	1036 (94)	65 (6)	
Present	99 (78)	28 (22)	
Self-rated clinical scales			
Brief Symptom Index (current)			$Z = 4.711$; $P < .001$
Mean score (SD)	57.9 (18.3)	67.3 (22.7)	
(Missing data)	(14)	(5)	
Michigan Assessment Screening Test/ Alcohol–Drug (lifetime)			$Z = 4.932$; $P < .001$
Mean score (SD)	32.1 (45.3)	52.1 (50.0)	
(Missing data)	(15)	(5)	
Posttraumatic Stress Checklist (current)			$Z = 3.819$; $P < .001$
Mean score (SD)	29.1 (15.6)	36.2 (19.4)	
(Missing data)	(15)	(5)	

[a]Percentages read across the page, with rows summing to 100%.
[b]This category consisted of homes for the elderly, halfway houses, and state veterans' homes.

symptoms, were associated with pathological gambling (*P* value range: <.001 to <.002).

Regression Analysis

The significant binary variables of logistic regression were ethnicity (American Indian vs Hispanic) and any mood, anxiety, substance use, or antisocial personality disorder (presence vs absence). On forward conditional analysis, we retained the following items: ethnicity (American Indian vs Hispanic, odds ratio [OR]=2.26, 95% confidence interval [CI]=1.36, 3.77); any mood disorder (OR=2.39, 95% CI=1.29, 4.11); any substance use disorder (OR=1.67, 95% CI=1.03, 2.72); antisocial personality disorder (OR=1.27, 95% CI=1.10, 1.45). Anxiety disorders were dropped from the analysis.

DISCUSSION

Ethnicity and Lifetime Prevalence

American Indians. The significantly higher rate of pathological gambling found among American Indian veterans, compared to that among Hispanic veterans, in our study supports the Volberg and Steadman[4] hypothesis that the highest rates of pathological gambling are observed in areas proximate to legalized gambling. The American Indian rate of pathological gambling was 9.9%, with 9.8% in the southwest region and 10.0% in the north central region—a striking similarity in view of the many differences in tribal history and culture between the 2 regions. Although these rates are the highest reported for American Indian populations in any study conducted to date, the 9.9% American Indian rate in the present study was only 2.8% higher than the 7.1% lifetime prevalence found among 434 American Indian adults studied in North Dakota by Volberg and Abbott,[10] who used the adult SOGS instrument and a telephone survey. The 95% confidence interval for our sample (7.7%, 12.1%) overlapped the 95% confidence interval in the Volberg and Abbott study (4.7%, 9.5%). Thus, the lifetime prevalence in these 2 studies do not differ significantly.

The lifetime prevalence of pathological gambling among American Indian veterans in our study was more than 3 times the 2.8% rate of pathological gambling found in Zitzow's[9] telephone survey of 119 adult American Indian adults living on a Minnesota reservation. The 95% confidence interval for the 119 American Indian adults in that study (0%, 5.8%) did not overlap the 95% confidence interval for the 718 American Indian veterans in our sample (7.7%, 12.1%). Lack of overlap between the 95% confidence intervals indicates a significant difference between rates from Zitzow's study and those from our study.

Hispanics. The lifetime pathological gambling rate among all Hispanic veterans in this study was 4.3%, a rate almost 1% higher than the highest rates observed in general populations in states with legal gambling.[6] Regional rates among Hispanic veterans in the southwest and north central regions, although not statistically different from each other, were higher in southwest Hispanic veterans (14 of 248 [5.6%]) compared with north central Hispanic veterans (8 of 262 [3.1%]). The 3.1% prevalence observed among Hispanic veterans in the north central region (95% CI=1.0%, 5.2%) was at the high end of rates observed in states with legal gambling.[3] The 95% confidence interval for the 5.6% prevalence in southwestern Hispanic veterans

(2.7%, 8.5%) overlapped the 3.4% rate for the general population reported by Volberg and Steadman.[4]

Differing methods. Research methods could also affect the lifetime prevalence rates of pathological gambling observed across ethnic groups in various studies. For example, in the study by Volberg and Abbott,[10] 88% of the respondents were contacted by telephone and 12% were contacted in other ways. Zitzow contacted all participants by telephone. The use of telephones to contact American Indian subjects on the reservation in both the Volberg and Abbott[10] and Zitzow[9] studies could have skewed results, because only 25% to 50% of American Indian reservation dwellers are known to have telephones.[32,33] Historic difference could also account for the differing rates, because the 2 telephone surveys occurred several years after casino gambling on reservations began but several years before our study. Another potential cause for the differing rates could be the use of 2 instruments: SOGS[34] and the *DSM-IV* diagnostic criteria for pathological gambling (e.g., especially within the DIS and Q-DIS formats). In a large study of 1616 patients and community subjects, the rate of *DSM* true-positive results with the SOGS was 97%, whereas the rate of true-negative results between the 2 instruments was 99%, showing a high correlation.[27]

Within the constraints of our study, we conclude that rates of lifetime pathological gambling among Hispanic veterans in the north central region are high but no higher than rates in general populations exposed to legal gambling. Moreover, our American Indian rates are higher than Hispanic rates and those among the general population, but no higher than American Indian rates observed in North Dakota by Volbert and Abbott.[10]

Demographic Characteristics and Pathological Gambling

Based on several previous studies,[2,4,10,20,21] we anticipated that fewer female veterans would manifest pathological gambling, a prediction not supported by the data. Zitzow[9] also found that American Indian men and women in northern Minnesota were at equal risk of problematic gambling. However, the Zitzow sample was small (119 total participants), and our study included only 125 American Indian or Hispanic female veterans. Studies with more female veterans would be needed to clarify whether military duty or veteran status are risk factors for pathological gambling in women. Volberg[35] recently described the "feminization" of gambling—increased numbers of women drawn to gambling as a result of casinos' targeting women through advertising and creating gambling venues that specifically appeal to women. With more women gambling, more cases of pathological gambling among women may result. If Volberg's hypothesis proves correct, American Indian and Hispanic women may be in the vanguard of this feminization phenomenon.

Analysis by age deciles revealed an unusual finding: a peak rate in the 40s, followed by decreased rates in the older age groups. Other things being equal, one would expect the lifetime rate to persist or increase with age. One explanation might be that there is a critical age for the development of pathological gambling, perhaps in the 30s and younger, because those in their 40s now would have been in their 30s when casino gambling appeared. Within this model, people would be at lower risk for pathological gambling if they had no casino gambling experience before age 40. Another interpretation of the data could be that veterans with pathological gambling die at higher-than-expected rates after age 50. For example, premature death might ensue from comorbid psychiatric disorders among those with pathological gambling.

None of the other demographic characteristics (education, employment status, marital status, nature of residence, urban/rural residence, and combat status) affected gambling status in our study. In 1 study in which demographic data were available, gambling rates did vary by marital status.[9] Although Niederland[38–40] suggested that war trauma increases the risk for pathological gambling, our data did not show a correlation with combat experience.

Psychiatric Comorbidity and Pathological Gambling

Previous studies. Community surveys of pathological gambling have generally not emphasized comorbid psychiatric disorders and symptoms as we did in this study. The single community survey in which psychiatric disorder was studied (also by means of the DIS) was limited by a low rate of pathological gambling (0.9%) and the reporting of only a few comorbid conditions.[1] Conducted in 1981, the study preceded the wide availability of casino gambling.

Comorbidity and sample representativeness. In our study, the lifetime prevalence of any Axis I psychiatric disorder was 70% among 103 veterans with pathological gambling compared with a 46% prevalence among the 1135 veterans without pathological gambling—a significant difference. The lifetime prevalence of any Axis I disorder in our sample (49.2%) was higher than that among the general population in the Epidemiologic Catchment Area study in the early 1980s[36] but comparable to the lifetime prevalence in the National Comorbidity Survey in the early 1990s.[37]

The Matsunaga study, a national epidemiological study of American Indian and Hispanic veterans conducted in the early 1990s[32] provides another data set for purposes of contrast. Compared with rates among this earlier study of veterans, our lifetime rates of Axis I psychiatric disorders were similar or lower (except for panic disorder in Hispanic veterans) (Table 2). Veterans in the Matsunaga study had a higher rate of combat exposure (58.5%) compared with veterans in our sample (30.1%). In addition, the earlier study focused heavily on Vietnam-era veterans, whereas our study included both older (e.g., WWII, Korean War) and younger (e.g., Gulf War) veterans. These factors may account for the higher rates of alcohol abuse/dependence and PTSD observed in the Matsunaga study.

Types of psychiatric comorbidity. Clinical studies have demonstrated that high rates of comorbid substance use disorders,[11,12,17,18,20,25] mood disorder,[12,14,16] and any Axis I psychiatric disorder[13,19] are associated with pathological gambling. Results from our community survey of American Indian and Hispanic veterans confirmed these studies. Our findings further indicated that psychiatric comorbidity is present throughout the course of pathological gambling and is not simply a precipitant for treatment seeking.

TABLE 2—Comparison of Data on American Indian and Hispanic American Veterans in Our Study With Data From Matsunaga Study

	Our Study		Matsunaga Study[32]		
	American Indian (n = 718), %	Hispanic American (n = 510), %	Northern Plain American Indian (n = 100), %	Southwest American Indian (n = 118), %	Hispanic American (n = 300), %
Major depressive disorder	9.9	14.1	12.1	11.8	8.2
Panic disorder	4.7	5.1	9.1	6.9	1.7
Alcohol disorder	35.2	22.9	80.0	84.8	49.3
Posttraumatic stress disorder	14.2	12.2	57.2	45.3	33.7

Comorbid anxiety disorder involves some special issues. We found a relationship between any anxiety disorder and pathological gambling in the dyadic comparison but not in the regression analysis. The finding of an association between any anxiety disorder and pathological gambling on the dyadic analysis but not in the regression analysis suggests that diagnosis of any anxiety disorder might have been highly correlated with mood or substance disorder, causing it to drop out from the regression analysis. We plan to examine this issue in subsequent analyses.

These data also revealed an elevated dyadic association between pathological gambling and PTSD. On the basis of anecdotal clinical experience with wartime survivors, Niederland[38–40] suggested that exposure to trauma might increase the risk of pathological gambling. Our tentative finding indicates the need for further study of the role of trauma in gambling behavior.

Conclusions

American Indian veterans manifested a significantly higher rate of pathological gambling than Hispanic veterans, supporting the Volberg and Abbot hypothesis regarding the role of access to gambling as an etiological factor. Rates of pathological gambling among male and female veterans were equal in our study, unlike most reports' findings of higher rates among men. This finding may herald the "feminization" of gambling that Volberg predicted in 2003 after observing changes in the gambling industry. Our data concerning 2 racial/ethnic groups confirmed the association of pathological gambling with substance use, mood, and antisocial personality disorder across cultures. The association of pathological gambling and any anxiety disorder was more complex than previously described, with the dyadic association being lost in the regression analysis. The relatively high rate of posttraumatic stress disorder (one of the anxiety disorders) may have contributed to this unexpected dyadic association of pathological gambling with any anxiety disorder. Further study is needed regarding a possible trauma–gambling link. ■

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Contributors

J. Westermeyer and J. Canive conceptualized the study and supervised all aspects of its implementation at the 2 sites. J. Garrard participated in writing the grant, developing the qualitative analyses, analyzing the data, and writing the article. P. Thuras finalized the database and conducted the statistical analyses. J. Thompson participated in development of the research instruments, sampling plan, and data analysis and in writing the article.

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Human Participant Protection

The institutional review board at the Minneapolis VA Medical Center approved this study.

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