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Gambling, Health, and Age: Data from the National Epidemiologic Survey on Alcohol and Related Conditions

Rani A. Desai, Mayur M. Desai, and Marc N. Potenza
Yale University and Veteran's Affairs Connecticut Healthcare System

The health effects of recreational gambling are presently unclear, particularly across age groups. Theories of healthy aging suggest that social activities, including gambling, may be beneficial to the health of older adults. Using cross-sectional data from the National Epidemiologic Survey on Alcohol and Related Conditions (N = 43,093), the authors examined associations between gambling (categorized as nongambling, recreational gambling, or problem/pathological gambling) and health and functioning measures stratified by age (40–64 years and ≥ 65). Problem/pathological gambling was uniformly associated with poorer health measures among both younger and older adults. Among younger respondents, poorer health measures were also found among recreational gamblers. However, among older respondents, recreational gambling was associated not only with some negative measures (e.g., obesity) but also with some positive measures (e.g., better physical and mental functioning). Longitudinal studies are needed to clarify the relationship between gambling and health in older adults in the context of healthy aging.

Keywords: gambling, older adults, health correlates, substance abuse/dependence, addiction

Although more than two thirds of the U.S. adult population reports gambling in the previous year (Potenza, Kosten, & Rounsaville, 2001), most people gamble recreationally, without developing a gambling problem. Problem and pathological gambling (PPG) can result in large financial and social losses and substantial personal distress (Argo & Black, 2004), but it is experienced by less than 5% of the adult population (Shaffer & Hall, 2001; Shaffer, Hall, & Vander Bilt, 1999). However, the increased availability and social acceptance of gambling have raised public health concerns about the potential dangers of even less destructive patterns of gambling (Blanco, Hasin, Petry, Stinson, & Grant, 2006; Desai, Maciejewski, Dausey, Caldarone, & Potenza, 2004; Shaffer & Hall, 2001; Shaffer et al., 1999; Shaffer & Korn, 2002). Moreover, segments of the population, such as older adults (Desai, 2004; Gerstein et al., 1999), with rapidly rising rates of gambling participation may be particularly vulnerable to developing gambling problems and to experiencing negative health consequences of gambling. It is thus important to understand the health correlates of varying severity levels of gambling, particularly among vulnerable populations.

Substantially more older adults are gambling now than in prior decades. In 1975, 23% of those aged ≥ 65 years reported gambling in the previous year; by 1998, the percentage had risen to 50% (Gerstein et al., 1999). Older adults appear to represent an attractive demographic for gambling venues, such as casinos. They are the fastest growing segment of the population and often have substantial time for social and leisure activities (Desai et al., 2004; Gosker, 1999; Vander Bilt, Dodge, Pandav, Shaffer, & Ganguli, 2004; Zaranek & Chapleski, 2005). Many assisted-living facilities offer gambling (e.g., bingo) as a regular leisure activity and organize trips to local casinos. In-house bingo games in nursing homes were recently cited as the single most regularly attended leisure activity, with 23% of residents participating at least four times a month (McNeilly & Burke, 2000). Gambling is also an important leisure activity for community-dwelling seniors, particularly those engaging in multiple social activities (Vander Bilt et al., 2004; Zaranek & Chapleski, 2005).

Pathological gambling (PG) is associated with adverse health measures (Gerstein et al., 1999; National Research Council, 1999; Petry, Stinson, & Grant, 2005). Patients entering treatment for PG often have other mental health problems, including depression, anxiety, substance abuse, and personality disorders (Lesieur & Rosenthal, 1991); worse physical health (Erickson, Molina, Ladd, Pietrzak, & Petry, 2005); and poorer social functioning, as measured by rates of divorce, arrest, and incarceration (Blaszczynski & Silove, 1996). Such problems are also seen among people who are not in treatment but are identified as meeting criteria for PG in community and primary care samples (Blanco et al., 2006; Erickson et al., 2005; Gerstein et al., 1999; Petry et al., 2005). Older adults may be particularly impacted by gambling problems due to restricted incomes, the inability to work to recover gambling losses, and poorer baseline health as a function of advanced age

Rani A. Desai, Mayur M. Desai, and Marc N. Potenza, Department of Psychiatry; Department of Epidemiology and Public Health; and Women and Addictive Disorders Core Research Area, Women's Health Research at Yale, School of Medicine, Yale University, and Veterans Affairs Connecticut Healthcare System, West Haven, Connecticut.

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Correspondence concerning this article should be addressed to Rani A. Desai, Veterans Affairs Connecticut Healthcare System, 950 Campbell Avenue, NEPEC/182, West Haven, CT 06516. E-mail: rani.desai@yale.edu

(Desai et al., 2004; McNeilly & Burke, 2002; Pavalko, 2002). This greater vulnerability in older adults, coupled with increasing access to gambling, highlights the need to understand age-related differences in the risks associated with gambling (Fessler, 1996; Grant Stitt, Giacopassi, & Nichols, 2003; Ladd, Molina, Kerins, & Petry, 2003; Levens, Dyer, Zubritsky, Knott, & Oslin, 2005; McNeilly & Burke, 2002).

Whereas the detrimental effects of PG are relatively clear, the health effects of recreational gambling are less clearly understood, particularly for older adults. One study conducted in a primary care sample found that older recreational gamblers reported worse physical and mental health than nongamblers (Levens et al., 2005). Another study utilizing a community sample found a cross-sectional association between recreational gambling and better subjective health assessments (Desai, Maciejewski, Dausey, Caldarone, & Potenza, 2004). To our knowledge, only one longitudinal study of gambling in the elderly has been published (Vander Bilt et al., 2004). Individuals with increased social support and greater alcohol use at baseline were more likely to gamble at follow-up, adjusting for baseline gambling participation (Vander Bilt et al., 2004). The study did not examine health outcomes as a function of gambling participation, either at baseline or during the follow-up.

Together, these studies raise important questions regarding the health effects of gambling on older adults. On the one hand, primary care data suggest that elders who gamble suffer worse physical and mental health than do nongamblers (Levens et al., 2005). This notion is consistent with findings that recreational gambling in community samples of adults is associated with poorer measures of health, depression, alcohol and drug use, incarceration, and bankruptcy (Desai et al., 2004; Desai & Potenza, in press; Potenza, Maciejewski, & Mazure, 2006). Conversely, it has been suggested that, if performed responsibly by seniors, gambling, especially social gambling, may be enjoyable, increase activity in the community, and thus impart health benefits (Desai et al., 2004; Vander Bilt et al., 2004). This hypothesis is bolstered by the healthy aging literature (Glass, De Leon, Bassuk, & Berkman, 2006; Glass, de Leon, Marottoli, & Berkman, 1999; Lennartsson & Silverstein, 2001; Mendes de Leon, Glass, & Berkman, 2003; Mendes de Leon, Gold, Glass, Kaplan, & George, 2001; Penninx, Leveille, Ferrucci, van Eijk, & Guralnik, 1999; Simonsick, Kasper, & Phillips, 1998), which has indicated that seniors who engage in social activities experience a health benefit in terms of lowered disability and mortality similar to that experienced by those who engage in physical activity (Glass et al., 1999).

The above-mentioned gambling studies have important limitations. First, primary care samples (Levens et al., 2005) are biased by poorer health status, and this selection bias may magnify the association between gambling and poor health measures. Second, the study that found a positive association between recreational gambling and health among older adults (Desai et al., 2004) utilized a single subjective measure of health and also may have been biased by self-assessments of health (e.g., gamblers may be less realistic, or more optimistic, about their health than nongamblers).

The current study addresses these limitations. We used a large community sample of noninstitutionalized adults to explore the associations between gambling and a range of both subjective and objective health measures and to examine whether these associations are different in people aged 40–64 years versus ≥ 65 years. Given the heterogeneity in health measures in the larger group of adults under age 65, we chose to focus our comparison of older adults with those aged 40–64 years.

We hypothesized that PPG would be associated with poorer health measures among both younger and older respondents, that recreational gambling would be associated with poorer health measures among younger respondents, and that recreational gambling would be associated with better health measures among older respondents.

Method

Sample

Data for this study come from the 2001–2002 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), which is described elsewhere in greater detail (Grant, Kaplan, Shepard, & Moore, 2003; Grant et al., 2004). Briefly, the NESARC, conducted by the National Institute on Alcohol Abuse and Alcoholism and the Bureau of the Census, surveyed a nationally representative sample of noninstitutionalized U.S. residents (citizens and noncitizens) aged 18 years and over. Respondents were identified using a multistage cluster sampling technique, and the sample was enhanced with members of group-living environments, such as dormitories, group homes, shelters, and facilities for housing workers. Jails, prisons, and hospitals were not included. Weights were calculated to adjust standard errors for these oversamples, the cluster sampling technique, and nonresponse (Grant, Dawson, et al., 2003). The final NESARC sample consisted of 43,093 respondents, representing an 81% response rate. The current analysis restricted the sample to those age 40 years and over, resulting in a sample of 25,485 respondents. All respondents gave consent to participate, and the current investigation utilized the publicly accessible, deidentified data set, and was thus exempt from institutional review board approval.

Measures

The Alcohol Use Disorder and Associated Disabilities Interview Schedule–*DSM–IV* Version (AUDADIS-IV; Grant, Dawson, et al., 2003), a structured diagnostic assessment tool, was administered by trained lay interviewers. The instrument was tested for reliability and validity and found to be a good measure for detecting psychiatric disorders in a community sample (Grant, Dawson, et al., 2003). Nicotine dependence and alcohol abuse/dependence variables used in this analysis were defined using the criteria of AUDADIS-IV and the *Diagnostic and Statistical Manual of Mental Disorders,* (4th ed., text rev.; *DSM–IV;* American Psychiatric Association, 2000). The publicly accessible NESARC data set contains diagnostic variables derived from AUDADIS-IV algorithms and is based on *DSM–IV* criteria.

The dependent variable in the present analyses was severity of gambling problems, based on the ten diagnostic inclusionary criteria for PG. Given data that suggest that gambling severity lies along a continuum (Crockford & el-Guebaly, 1998; Cunningham-Williams, Cottler, Compton, & Spitznagel, 1998; National Research Council, 1999; Slutske et al., 2000), and consistent with

previous population-based studies, including the NESARC (Desai et al., 2004; Desai, Maciejewski, Pantalon, & Potenza, 2006; Desai & Potenza, in press; National Research Council, 1999; Potenza et al., 2006), we divided the sample into three groups: nongamblers, who reported that they had never gambled $>$ 5 times in a single year in their lifetime; recreational gamblers, who reported gambling $>$ 5 times in a year but $\leq$ 2 symptoms of PG in the previous year; and problem/pathological gamblers (PPG), who reported $\geq$ 3 symptoms of pathological gambling in the previous year. These categories are analogous to Shaffer and Korn's level-based nomenclature, with the nongambling group corresponding to Level 0, the recreational group corresponding to Level 1, and the PPG group corresponding to Levels 2 and 3 (Shaffer & Korn, 1999). The recreational gambling group (with two or fewer inclusionary criteria of PG) is defined virtually identically as in prior studies (Desai et al, 2004; Potenza et al., 2006) and in a manner similar to other studies using other assessments, for example, defining recreational gamblers as those gamblers scoring 0–2 on the South Oaks Gambling Screen (Morasco, vom Eigen, & Petry, 2006). The low frequency of PG (less than 1% of the sample reported $\geq$ 5 symptoms, the threshold for PG) necessitated the combination of the problem and pathological groups, a strategy employed in prior gambling studies (Cunningham-Williams et al., 1998; Shaffer & Hall, 2001).

Health status was assessed using several measures. A subjective rating of health was determined using a 5-point Likert scale, ranging from *poor* to *excellent*. Obesity was defined as having a body mass index of $\geq$ 30 kg/m^2, based on self-reported weight and height.

Using a checklist of chronic medical conditions, respondents were asked whether they had been told by a physician in the past 12 months that they had heart disease (specifically, hardening of the arteries or arteriosclerosis, high blood pressure or hypertension, chest pain or angina pectoris, rapid heart beat or tachycardia, a heart attack or myocardial infarction, or any other form of heart disease); liver disease (specifically, cirrhosis or any other form of liver disease); stomach disease (specifically, a stomach ulcer or gastritis); or arthritis. Respondents were asked whether they had been hospitalized in the previous 12 months (excluding labor and delivery) and whether they had had an injury in the past 12 months that prompted medical help and/or restriction in activities for at least half a day.

The Short Form–12 (SF-12) general health instrument was used to assess physical and mental health functioning (Ware, Kosinski, & Keller, 1996). Responses to the assessment questions were compiled and standardized to U.S. national data in order to compute two summary scores for physical and mental health.

The following sociodemographic variables were included in analyses: age (dichotomized as $<$ 65 vs. $\geq$ 65 years), gender, race/ethnicity, education, marital status, employment status, and annual household income. As in prior studies (Desai et al., 2004) age 65 was selected as a threshold for older adult status given that many significant life events (e.g., retirement and Social Security eligibility) occur around this age (Desai, 2004). Binary variables for three race/ethnicity groups were created (Black, White, and Hispanic). Respondents were asked to identify themselves as Hispanic or not. Additionally, respondents were free to identify more than one racial group. Because respondents could acknowledge more than one race, binary racial variables were not mutually exclusive, and respondents who endorsed both White and Black were coded as 1 for both variables.

Data Analyses

The primary research questions concerned age differences in the associations between gambling and health measures. We first examined associations between age and other sociodemographic characteristics and between age, gambling, and other sociodemographic variables in order to identify measures for which to adjust in multivariable models. Next, we examined unadjusted associations between health measures and gambling, stratified by age group. Finally, we fit multinomial logistic regression models with the three-level gambling variable as the dependent variable of interest. Using nongamblers as the reference level, the multinomial models yielded two sets of odds ratios, one for recreational gamblers versus nongamblers and the other for PPG versus nongamblers. Main effects were entered for the health measures and the sociodemographic characteristics. A series of age interactions were tested to determine whether the associations between individual health measures and gambling severity were significantly different across younger and older respondents. Multinomial logistic regression models were utilized instead of proportional odds logistic regression because the assumption of homogeneity of odds ratios across outcome groups was violated (Tabachnick & Fidell, 2001). We performed all analyses using SUDAAN software (Research Triangle Institute, 2005); given the survey's complex sample design, this approach allowed for appropriate variance estimation for parameter estimates.

Results

Of the 25,485 respondents, 17,280 (72%) were aged 40–64 years and 8,205 (28%) were aged $\geq$ 65 years. Chi-square analyses identified all sociodemographic variables as statistically significantly different across age groups. Women and those of White race, less education, previously married, not currently working, and lower income were older (Table 1).

Table 2 presents the sociodemographic characteristics of the gambling groups, stratified by age. Among respondents aged 40–64 years, the weighted prevalence estimates for nongambling, recreational gambling, and PPG were 68.7%, 30.8%, and 0.5% respectively. Differences significant at $p < .05$ were observed for gender, White race, Hispanic ethnicity, education, marital status, and household income. More White, male, previously married, full-time and part-time employed subjects and fewer Hispanic respondents and college graduates reported gambling.

Among older respondents, overall rates similar to those of younger adults were found for nongambling (71.1%), recreational gambling (28.7%), and PPG (0.3%). Differences significant at $p <$ .05 were observed for gender, education, marital status, employment and household income. More male, well-educated, married subjects and fewer nonworking respondents reported gambling. In both age groups, recreational gamblers had the highest average incomes.

Table 3 presents the unadjusted associations between health status measures and gambling group, stratified by age. Among younger respondents, gambling was significantly associated with poor subjective health, nicotine dependence, alcohol abuse/

Table 1
Sociodemographic Characteristics of the NESARC Sample, by Age Group

Variable	Total (N = 25,485)		Younger (40–64 yrs) (n = 17,280; 72%)		Older (≥ 65 years) (n = 8,205; 28%)		Analysis		
	n	%[a]	*n*	%[b]	*n*	%[b]	χ^2	*df*	*p*
Gender							47.95	1	<.0001
Male	10,878	46.8	7,774	74.9	3,104	25.1			
Female	14,607	53.2	9,506	69.6	5,101	30.4			
Black race	5,020	10.3	3,627	77.7	1,393	22.3	41.10	1	<.0001
White race	19,681	85.3	13,046	71.0	6,635	29.0	31.75	1	<.0001
Hispanic ethnicity	3,683	7.9	2,788	80.8	895	19.2	27.26	1	<.0001
Education							180.38	3	<.0001
Less than high school	5,137	16.9	2,492	54.0	2,645	46.0			
High school or GED	7,613	30.5	4,948	68.4	2,665	31.6			
Some college	6,716	27.1	5,072	78.5	1,644	21.5			
College degree or higher	6,019	25.5	4,768	81.5	1,251	18.5			
Marital status							137.15	2	<.0001
Married	13,726	68.4	10,248	76.7	3,478	23.3			
Previously married	9,219	24.6	4,921	55.6	4,298	44.4			
Never married	2,540	7.1	2,111	84.5	429	15.5			
Employment status							182.24	2	<.0001
Full-time	11,254	47.3	10,816	96.7	438	3.3			
Part-time	2,078	8.7	1,545	78.8	533	21.2			
Not working	12,153	43.9	4,919	44.2	7,234	55.9			
Annual household income ($)[c]									
M and *SE*	55,978	1,004	64,039	1,195	35,201	886			

Note. Data are unweighted sample sizes, except as indicated. NESARC = National Epidemiologic Survey on Alcohol and Related Conditions.
[a] All percentages represent column percentages. [b] All percentages represent row percentages. [c] $F(1, 43091) = 556.55$, $p < .0001$.

dependence, obesity, chronic medical conditions, and physical and mental health SF-12 scores. Among older respondents, gambling was associated with nicotine dependence, alcohol abuse/dependence, obesity, any chronic medical condition, and physical and mental health SF-12 scores. The lowest physical and mental health SF-12 scores were observed in the PPG respondents across age groups. Although statistical tests are presented for consistency, they should be assessed with caution due to small cell sizes for some variables.

Table 4 presents the results of multinomial logistic regression models examining the relationship between gambling and health, by age and adjusting for sociodemographic characteristics. The first set of columns present results comparing recreational gamblers to nongamblers. Both younger and older recreational gamblers were significantly more likely than their nongambling counterparts to meet criteria for nicotine dependence, odds ratio [OR] = 1.67 and 2.19, respectively, and the nonsignificant interaction term ($p = .08$) suggests that this association was largely similar across age groups. Younger recreational gamblers were 1.71 times more likely to meet criteria for alcohol abuse/dependence; however, older recreational gamblers were 3.40 times more likely to meet these criteria, a significantly stronger association (interaction $p = .014$). Both younger and older recreational gamblers were more likely to be obese than were their nongambling counterparts (OR = 1.31 and 1.26, respectively), and this association was similar across age groups (interaction $p = .70$). Younger recreational gamblers were significantly more likely than older recreational gamblers to report at least one chronic condition (interaction $p = .02$).

Among younger adults, recreational gamblers reported significantly poorer subjective health than did nongamblers (OR = 0.88, $p = .01$). However, among older recreational gamblers compared with older nongamblers, there were elevated odds for better subjective health ratings, although it was statistically nonsignificant (OR = 1.11, $p = .15$). This difference across age groups was statistically significant ($p = .003$). Although there was no association between injury and gambling among younger respondents ($p = .53$), older recreational gamblers were significantly less likely than older nongamblers to have been injured in the past year (OR = 0.86, $p = .04$). However, the interaction was not statistically significant ($p = .07$).

In contrast, although there were no associations between SF-12 scores and gambling among younger respondents, SF-12 scores were significantly higher among older recreational gamblers than among older nongamblers, indicating better physical (OR = 1.10; $p < .001$) and mental (OR = 1.10, $p = .003$) health functioning among older recreational gamblers as compared to nongamblers. Physical and mental health functioning in association with recreational gambling was significantly different across age groups ($p = .01$ and $p = .02$, respectively).

The second set of columns in Table 4 compares PPG gamblers to nongamblers on the various measures of health status. Among younger adults, PPG was significantly associated with nicotine dependence, alcohol abuse/dependence, obesity, and lower SF-12 physical health scores. Although not statistically significant, qualitatively similar results were generally observed when comparing older PPG gamblers to older nongamblers. Tests of significance

Table 2
Sociodemographic Characteristics of the NESARC Sample, by Age Group and Severity of Gambling Problem

	Younger (40–64 years)									Older (≥ 65 years)								
	Nongamblers (n = 11,720; 68.7%)		Recreational gamblers (n = 4,996; 30.8%)		Problem/ pathological (n = 103; 0.5%)					Nongamblers (n = 5,835; 71.1%)		Recreational gamblers (n = 2,170; 28.7%)		Problem/ pathological (n = 14; 0.3%)				
Variable	n	%[a]	n	%	n	%	χ^2	df	p	n	%	n	%	n	%	χ^2	df	p
Gender							80.79	1	<.0001							84.93	2	<.0001
Male	4,786	62.6	2,698	36.9	54	0.6				1,906	62.7	1,116	37.0	6	0.3			
Female	6,934	74.4	2,298	25.2	49	0.4				3,929	77.2	1,054	22.6	8	0.2			
Black race																		
Yes	2,427	68.6	1,054	30.8	29	0.6	0.73	2	.6944	1,004	73.0	344	26.3	6	0.7	3.71	2	.16
No	9,293	68.7	3,942	30.8	74	0.5				4,831	70.9	1,826	28.9	8	0.2			
White race																		
Yes	8,846	68.4	3,810	31.3	64	0.4	11.94	2	.0042	4,708	71.0	1,782	28.9	7	0.2	3.02	2	.23
No	2,874	70.3	1,186	28.5	39	1.0				1,127	72.2	388	27.2	7	0.6			
Hispanic ethnicity																		
Yes	2,098	77.1	608	22.5	14	0.4	20.59	2	.0001	694	77.4	183	22.3	1	0.3	4.78	2	.10
No	9,622	67.8	4,388	30.8	89	0.5				5,141	70.7	1,987	29.0	13	0.3			
Education							43.91	6	<.0001							24.03	6	.002
Less than high school	1,740	69.5	651	29.4	26	1.0				1,969	75.5	599	24.4	3	0.1			
HS or GED	3,290	67.0	1,492	32.3	34	0.7				1,837	68.7	761	31.0	5	0.3			
Some college	3,255	65.1	1,650	34.5	30	0.4				1,138	69.8	477	29.9	1	0.3			
College degree or higher	3,435	73.6	1,203	26.2	13	0.2				891	70.4	333	29.2	5	0.4			
Marital status							16.20	4	.0054							26.77	4	.0001
Married	7,043	69.0	2,963	30.6	46	0.4				2,370	68.7	1,032	31.2	7	0.2			
Previously married	3,253	66.4	1,470	32.9	38	0.7				3,159	74.3	1,040	25.4	6	0.3			
Never married	1,424	71.0	563	28.2	19	0.8				306	74.7	98	24.7	1	0.6			
Employment status							7.39	4	.1304							21.50	4	.0008
Full-time	7,272	67.9	3,192	31.6	62	0.5				290	68.7	130	31.2	1	0.1			
Part-time	1,061	68.4	436	30.8	11	0.8				340	61.1	179	38.5	1	0.4			
Not working	3,387	70.5	1,368	29.0	30	0.4				5,205	72.0	1,861	27.8	12	0.3			
Annual household income ($)[b]																		
M and SE	63,656	1,305	65,089	1,770	50,185	3,920				33,884	1,013	38,518	1,495	34,720	6,861			

Note. Data are unweighted sample sizes and weighted percentages, except as indicated. NESARC = National Epidemiologic Survey on Alcohol and Related Conditions.
[a] All percentages calculated within age groups represent row percentages for that age group. [b] For younger group, $F(2, 34016) = 6.32$, $p = .0075$; for older group, $F(2, 8016) = 6.32$, $p = .008$.

Table 3
Associations Between Physical and Mental Health Measures and Severity of Gambling Problem, by Age Group

	Younger (40–64 years)								Older (≥ 65 years)							
	Nongamblers (n = 11,720; 68.7%)		Recreational gamblers (n = 4,996; 30.8%)		Problem/ pathological (n = 103; 0.5%)				Nongamblers (n = 5,835; 71.1%)		Recreational gamblers (n = 2,170; 28.7%)		Problem/ pathological (n = 14; 0.3%)			
Health measure	n	%[a]	n	%	n	%	χ^2	p	n	%	n	%	n	%	χ^2	p
Excellent/very good SRH							23.39	<.0001							5.15	.08
Yes	6,649	70.8	2,585	28.8	45	0.4			1,907	69.0	785	30.7	2	0.3		
No	5,035	65.7	2,400	33.7	58	0.6			3,914	72.2	1,384	27.6	12	0.2		
Nicotine dependence							66.29	<.0001							27.47	<.0001
Yes	1,198	55.1	903	43.3	42	1.7			180	53.0	138	46.0	2	1.1		
No	10,522	70.8	4,093	28.9	61	0.3			5,655	71.9	2,032	27.9	12	0.2		
Alcohol abuse/dependence							54.57	<.0001							28.15	<.0001
Yes	533	50.8	487	47.4	26	1.9			38	36.8	69	63.2	0	0.0		
No	11,187	69.9	4,509	29.7	77	0.4			5,797	71.6	2,101	28.1	14	0.3		
Obesity							32.62	<.0001							8.54	.02
Yes	3,045	63.6	1,595	35.8	33	0.6			1,098	67.0	498	32.6	6	0.5		
No	8,675	70.5	3,401	29.0	70	0.5			4,737	72.0	1,672	27.8	8	0.2		
Heart disease							38.91	<.0001							0.86	.65
Yes	3,063	63.1	1,650	36.3	41	0.6			3,210	70.5	1,254	29.2	10	0.3		
No	8,616	70.7	3,339	28.9	62	0.5			2,605	71.7	912	28.0	4	0.2		
Liver disease							7.95	.0235							1.07	.59
Yes	115	56.9	81	42.3	3	0.7			48	71.9	16	25.2	1	2.8		
No	11,564	68.8	4,908	30.8	100	0.5			5,767	71.1	2,150	28.7	13	0.2		
Stomach disease							6.88	.0379							1.44	.49
Yes	786	65.0	401	34.8	6	0.3			567	72.1	219	27.8	1	0.1		
No	10,893	68.9	4,588	30.6	97	0.5			5,248	71.0	1,947	28.8	13	0.3		
Arthritis							15.18	.0011							4.48	.11
Yes	2,212	65.0	1,126	34.3	31	0.8			2,784	72.4	979	27.3	7	0.3		
No	9,467	69.5	3,863	30.0	72	0.4			3,031	70.0	1,187	29.9	7	0.2		
Any chronic condition							38.86	<.0001							8.19	.02
Yes	4,453	64.1	2,354	35.3	53	0.6			4,205	70.7	1,618	29.0	14	0.4		
No	7,226	71.6	2,635	28.0	50	0.5			1,610	72.0	548	28.0	0	0.0		
Hospitalized in past year							3.81	.1573							3.45	.19
Yes	1,140	65.7	534	33.7	13	0.6			1,242	72.7	436	26.9	6	0.5		
No	10,510	68.9	4,451	30.6	89	0.5			4,529	70.6	1,722	29.2	8	0.2		
Injured in past year							3.63	.171							4.19	.13
Yes	1,143	65.8	534	33.6	14	0.6			1,257	72.9	434	26.6	6	0.5		
No	10,506	68.9	4,453	30.6	89	0.5			4,535	70.6	1,728	29.3	8	0.2		
SF-12 scores	M	SE	M	SE	M	SE	F[b]	p	M	SE	M	SE	M	SE	F[c]	p
Physical	42.3	0.2	43.6	0.3	40.7	4.0	11.48	.0001	41.9	0.2	43.2	0.2	36.8	4.8	5.63	.006
Mental	5.1	0.2	51.4	0.2	43.7	4.8	4.98	.0106	49.7	0.2	50.9	0.3	41.8	4.0	6.19	.006

Note. Data are unweighted sample sizes and weighted percentages, except as indicated. SRH = self-rated health; SF-12 = Short Form–12.
[a] All percentages represent row percentages. [b] df = 2, 33689. [c] df = 2, 7870.

Table 4
Adjusted Multinomial Logistic Regression Models of the Associations Between Physical and Mental Health Measures and Severity of Gambling Problem, by Age Group

	Younger (40–64 years)		Older (≥ 65 years)			Younger (40–65 years)		Older (≥ 65 years)		
Health measure	Odds ratio recreational vs. nongamblers	*p*	Odds ratio recreational vs. nongamblers	*p*	Age interaction *p*	Odds ratio PPG vs. nongamblers	*p*	Odds ratio PPG vs. nongamblers[a]	*p*	Age interaction *p*
Excellent/very good SRH	0.88	.0138	1.11	.1491	.0032	1.58	.9645	1.66	.6103	.9644
Nicotine dependence	1.67	<.0001	2.19	<.0001	.0831	4.08	<.0001	1.57	.6668	.4184
Alcohol abuse/dependence	1.71	<.0001	3.40	<.0001	.0138	3.70	.0002	—	<.0001	—
Obesity	1.31	<.0001	1.26	.0069	.6961	1.25	.0002	2.70	.1655	.3683
Any chronic condition	1.36	<.0001	1.10	.2083	.0247	1.08	.7645	—	<.0001	—
Injured in past year	1.05	.5259	0.86	.0422	.0656	0.83	.619	1.16	.8332	.6627
SF-12 score (per 10 points)										
Physical	1.01	.8987	1.10	.0008	.0085	0.74	.028	0.90	.6524	.5173
Mental	1.01	.7546	1.10	.0031	.0151	0.74	.0548	0.90	.1563	.4886

Note. Adjusted for gender, race, Hispanic ethnicity, education, marital status, employment status, annual household income, and the other health measures. PPG = problem/pathological gambler; SRH = self-rated health; SF-12 = Short Form–12.
[a] Dashes indicate that odds ratios were inestimable or unstable because of small cell sizes (see Table 3).

should be considered with caution due to the small number of older PPG gamblers in the older age sample ($n = 14$).

Discussion

This study extends our current understanding of the differential health correlates of gambling between younger and older adults. As the study findings and limitations are discussed below, the following important aspects of the present study should be considered. First, we utilized multiple measures (subjective and objective) of physical and mental health status. Second, we utilized health measures reflecting both clinical diagnoses and functioning in the community, an important distinction for older adults. Finally, we examined a nationally representative community sample that is unbiased by help-seeking or access to medical care.

The data suggest several important conclusions. First, as hypothesized, PPG gambling in younger adults was independently associated with a broad range of poor health measures. Substantively similar results were found for older PPG gamblers, but the associations failed to reach statistical significance due to limited sample size. Second, also as hypothesized, recreational gambling in younger respondents was negatively associated with multiple health measures, including poorer subjective health, nicotine dependence, alcohol abuse/dependence, obesity, and one or more chronic conditions. Third, among older respondents, there were significant associations between recreational gambling and health measures, although not always in the hypothesized direction. With respect to more subjective or functioning-related measures, older recreational gamblers tended to report better health than nongamblers. However, similar to their younger counterparts, older recreational gamblers were at increased risk for clinical diagnoses such as nicotine dependence, alcohol abuse/dependence, obesity, and any chronic condition compared to nongamblers.

Recreational Gambling and Health

Given the increased popularity of gambling as a recreational activity for all age groups, there has been considerable concern about the potential public health threat posed by gambling (Shaffer et al., 1999; Shaffer & Korn, 2002). To date, there has been relatively little research exploring recreational gambling patterns and correlates (Desai et al., 2004, 2006; Desai & Potenza, in press; Potenza et al., 2006). The current results agree with previous findings that recreational gambling is associated with multiple negative health measures (Desai et al., 2006; Desai & Potenza, in press; Potenza et al., 2006). Because the data are cross-sectional, it is difficult to establish temporal relationships between gambling and health variables, such as smoking and alcohol use. It is therefore possible to suggest several competing, although not necessarily mutually exclusive, explanations, all of which are consistent with the data. However, it should be noted that these are still speculative and that future longitudinal studies of the health impact of gambling participation are needed to more fully examine these possibilities.

First, respondents who have poorer health measures (e.g., respondents who smoke, drink, or are obese) may be more likely to be attracted to gambling as a recreational activity. Consistent with this explanation, gambling venues, such as casinos, typically allow smoking and drinking while gambling, and gamblers may often sit in one place for extended periods of time. Second, respondents who gamble regularly might be more likely to smoke or drink alcohol to excess. Several studies have observed an interactive effect of alcohol and gambling, such that the presence of alcohol and gambling together could increase the risk for both PPG and alcohol abuse/dependence (Welte, Barnes, Wieczorek, Tidwell, & Parker, 2001; Welte, Barnes, Wieczorek, & Tidwell, 2004). Finally, health measures and gambling may be associated with a third set of factors that are etiologically but independently associated with both. For example, common genetic risks for PG and

alcohol abuse/dependence and PG and depression exist in men (Desai et al., 2006; Ibanez et al., 2003; Potenza, Xian, Shah, Scherrer, & Eisen, 2005). Another possibility is that a behavioral phenotype common to gambling and these health measures may underlie these findings. For example, impulsivity or risk-reward decision making may link tendencies to engage in gambling, smoking, alcohol consumption, and over-eating (Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001; National Institute on Drug Abuse, National Institute of Mental Health, & National Institute of Diabetes & Digestive & Kidney Diseases, 2002; Potenza, 2006).

Regardless of the underlying mechanism for the association, these results raise concern that recreational gamblers may, in many respects, be less healthy than their nongambling counterparts. This has implications for primary care, where screening and brief intervention around gambling could be implemented, for mental health care, where people in treatment for alcohol abuse/dependence or other psychiatric disorders could be screened for gambling behavior and problems, and for public policy related to the expansion in availability of gambling venues, particularly near vulnerable populations, such as residents of assisted-living facilities.

Age Differences in Health Correlates of Recreational Gambling

Significant differences in the strength and direction of health correlates of recreational gambling across age groups were observed. In contrast to younger recreational gamblers who reported significantly poorer subjective health, older recreational gamblers did not significantly differ from their nongambling counterparts on ratings of subjective health. The Age $\times$ Gambling Group interaction was statistically significant, consistent with prior reports of such an interaction in adults who gamble recreationally (Desai et al., 2004). Similarly, among older respondents, recreational gamblers reported higher SF-12 scores for both physical and mental health functioning, as compared with nongamblers. The SF-12 is meant less to measure objective health (i.e., diagnoses) than to capture subjective assessment of functioning. The items in the instrument query, for example, whether health problems limit the extent or ability to accomplish daily tasks and whether health problems interfere with social relationships. For older adults, this measure may capture a general sense of well-being and functional mobility that is somewhat independent of objective health diagnoses, such as heart disease or arthritis. Coupled with the result that older recreational gamblers were also significantly less likely to report having had a serious injury in the past year, the common theme is that older recreational gamblers report better functioning than older nongamblers, despite similar levels of chronic illness.

Two possible explanations exist for this set of findings. First, older adults who function well enough to engage in social activities in the community may be more likely to gamble recreationally. Second, older adults may find that gambling keeps them social and more active than they might otherwise be, thereby conferring some health benefit. This explanation is consistent with the healthy aging literature that indicates that social and active adults live longer and happier lives (Glass et al., 1999; Vaillant & Mukamal, 2001). These two hypotheses are not mutually exclusive, and both may be operating simultaneously. Only through longitudinal examination will it be possible to rigorously test the relative strengths of these hypotheses and further specify the nature of the associations.

Although older recreational gamblers reported better functioning than did older nongamblers, they were also 3.4 times more likely to meet criteria for alcohol abuse/dependence. In part, this association may be explained by age-cohort differences; given the relatively recent increase in gambling availability, as well as the relative social unacceptability of gambling until recently, those older respondents who currently gamble may also be those most likely to use and abuse alcohol. However, the finding continues to raise concern, given the data on the interactive effects of gambling and alcohol (Welte et al., 2001, 2004) and raises the possibility that older gamblers who drink may be at higher risk for developing PPG than are their younger counterparts.

This study has several important limitations. First, the cross-sectional nature of the data precludes our ability to identify specific factors that might mediate the identified associations or to establish temporal patterns between gambling behavior and health status. Second, low rates of pathological gambling were reported, necessitating combining problem and pathological gambling into a single category. It is possible that there exist significant differences between the health correlates of problem and pathological gambling. Third, there are no established standards for categorizing gambling behavior across a continuum. For example, past-year nongamblers were those who had not gambled more than five times in a year in their lifetime, and gamblers were divided into groups with 0–2 symptoms of PG versus those with 3 or more symptoms. Although these groupings have been utilized in previous studies, they are not empirically derived thresholds.

In summary, gambling will likely remain a popular leisure activity among seniors. We remain concerned about the potentially negative health impact of gambling, particularly if those who are gambling are also smoking or drinking alcohol. The interactive effects of these activities may have negative health consequences, including the development or exacerbation of chronic conditions, such as heart disease or diabetes. Simultaneously, however, the results of this study suggest that if engaged in responsibly, recreational gambling may represent an activity that helps to keep seniors active and social, with a more positive attitude towards life. This, in turn, may have positive effects on disability, mobility, and mortality (Glass et al., 1999). However, the relationship between gambling and health across the lifespan will ultimately be understood adequately best through additional longitudinal examination.

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