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An Exploratory Study of Relationships Among Five-Factor Personality Measures and Forms of Gambling in Adults With and Without Probable Pathological Gambling

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Abstract
The present study explored relationships between personality domains and gambling forms in individuals with and without probable pathological gambling (PPG). Associations among personality domain scores obtained from the NEO Personality Inventory-Revised, endorsements of gambling activities on the South Oaks Gambling Screen (SOGS), and PPG as determined by the SOGS were examined with bivariate and logistic regression analyses. Compared to recreational gamblers, those with PPG scored significantly higher in neuroticism and lower in agreeableness and conscientiousness. Agreeableness was inversely associated with gambling on cards, sports, bingo, stock market, dice, and skill games. Conscientiousness was inversely associated with gambling on sports and animal racing. Extraversion was positively associated with gambling on cards, dice, and stocks. Neuroticism and openness were positively associated with gambling on animal racing and stock gambling, respectively. Significant interactions indicated stronger inverse associations between agreeableness and gambling in casinos, on sports, and on skill games and stronger positive associations between openness and gambling on stocks and skill games in individuals with PPG compared to those without. The results suggest different relationships between personality domain measures and specific forms of gambling in individuals with and without PPG. Future research efforts should examine how personality factors may be used to enhance policy, prevention, and treatment efforts.

Keywords Big five · Choice · Five-factor model of personality · Gambling disorder · Gambling forms · Pathological gambling

Introduction

Multiple contextual factors have been associated with gambling. For example, unpredictable, intermittent schedules of reinforcement may prolong gambling behaviors (Skinner 1974) and arbitrary topographical properties such as colors of gambling stimuli may bias betting patterns (Whiting and Dixon 2015). Additionally, the presence of some gambling

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stimuli increases the likelihood of making impulsive choice (Dixon et al. 2006). However, although almost two-thirds of US adults gamble in a given year (Gerstein et al. 1999) and may encounter contextual factors in a gambling environment, only a small percentage of individuals (under 5%) experience gambling problems, with prevalence estimates for past-year pathological gambling typically reported as less than 1% (Kessler et al. 2008; Petry 2005). Gambling involves interactions between the context and the individual, and thus further study into individual factors that may affect interactions with the gambling context will yield a more complete understanding of operative differences between individuals with problematic and recreational gambling.

Personality traits may represent durable thought and behavioral patterns of an individual across contexts and time (McCrae and Costa 2003). However, attempts to identify a "gambling personality" have achieved mixed results (Bagby et al. 2007; MacLaren et al. 2011b). One study found across forms of gambling that pathological gambling was associated with lower conscientiousness and higher neuroticism, and that excitement-seeking may be a common element across levels of gambling (Bagby et al. 2007). These findings resonate with those in college students, with a study finding negative correlations between gambling scores and levels of conscientiousness and agreeableness and positive correlations with neuroticism (MacLaren et al. 2011a). However, findings from a meta-analysis implicated negative urgency and low premeditation but not low perseverance or sensation-seeking in pathological gambling (MacLaren et al. 2011a). Much personality research in problem gambling has centered on various measures relating to impulsivity and excitement-seeking characteristics. Individuals who reported gambling for excitement gambled more frequently and reported more criteria indicative of probable pathological gambling (PPG; Pantalon et al. 2008), and individuals with PPG showed greater sensation-seeking and impulsivity (Alessi and Petry 2003; Estevez et al. 2015; Yan et al. 2016). Further, sensation-seeking has been linked to betting on more gambling forms (Coventry and Brown 1993; McDaniel and Zuckerman 2003), gambling interest (McDaniel and Zuckerman 2003), and increased frequency (Kuley and Jacobs 1988) and level (frequency of gambling multiplied by cash used) of gambling (Dickerson et al. 1987). However, other investigations have observed null results between aspects of PPG and these personality traits (e.g., Breen and Zuckerman 1999; MacLaren et al. 2011b; Parke et al. 2004).

Additional attempts to identify a gambling personality using big-five models have produced similarly mixed results. Using the NEO Personality Inventory-Revised (NEO-PI-R; Costa and McCrae 1992), Bagby et al. (2007) found that individuals with PPG scored higher on neuroticism and lower on conscientiousness and agreeableness than those without PPG. Further analyses of facets of these domains showed that individuals with PPG scored higher on impulsiveness and lower on deliberation and self-discipline. Myrseth et al. (2009) and Miller et al. (2013) noted the same pattern with neuroticism but also lower openness in individuals with PPG than those without PPG.

Further, psychiatric disorders, which may link to variations in personality traits, are frequently comorbid in individuals with PPG. In individuals with PPG, the odds of a diagnosable mental health disorder are often several times more likely than in the general population and show a dose–response effect such that greater problem-gambling severity is associated with higher likelihoods of psychiatric disorders (Cunningham-Williams et al. 1998; Desai and Potenza 2008). Substance use, mood, and anxiety disorders are particularly common (Chou and Afifi 2011; Lorains et al. 2011; Petry et al. 2005) and have been incorporated into personality models of gambling to aid in explaining individual differences. In a cluster analysis of personality measures in individuals with PPG, Vachon and Bagby (2009) found three distinct subtypes, each with a unique profile including those

termed simple (low rates of comorbid psychopathology; normative personality scores), hedonic (moderate rates of comorbid psychopathology; high excitement-seeking, positive emotions, and feeling; low dutifulness and deliberation), and demoralized (high rates of comorbid psychopathology; high impulsivity, anxiety, angry hostility, depression, self-conscientiousness, and vulnerability; low self-discipline, achievement striving, competence, dutifulness, and trust and warmth), indicating personality and psychopathological differences among gamblers.

A potential reason for possible differences in findings relating to personality features and gambling is that multiple forms of gambling exist and each may relate differently to specific personality features (Fang and Mowen 2009). Gamblers represent a heterogeneous population (Ladouceur et al. 2009) which may, in part, reflect a wide variety of available gambling forms. Electronic gambling machines (EGMs or slot machines) offer more immediate feedback, more sensory input, and faster rates of gambling and reinforcement relative to most other forms of gambling. Craps may be regarded as an "adrenaline rush" type of game for some individuals and may involve more social interaction and excitement as players take turns rolling dice and betting on each other's throws. Poker may involve social interaction and strategy such as "reading" and deceiving other players, while roulette may involve more mathematical strategies, and both may be slower paced than other forms of gambling. Sports gambling may involve a competitive aspect that may be linked to low levels of agreeableness. Different forms of gambling may engender different configurations of risk, excitement, social interaction, and pace, and how individual gamblers interact with these features may relate to personality features and do so differently in individuals with and without PPG.

The purpose of the present study was to explore relationships between personality features and forms of gambling in individuals with and without PPG. We examined associations between the five personality factors of the NEO-PI-R and lifetime engagement in gambling activities in recreational gamblers and those with PPG. We hypothesized that personality profiles would relate differently to engagement in specific forms of gambling. Specifically, (1) engagement in social forms of gambling such as cards and dice would be positively associated with extraversion and inversely associated with agreeableness; (2) conscientiousness would be inversely associated with gambling forms except strategic forms of gambling such as cards and sports betting, and (3) differential associations would be observed between neuroticism (found to be elevated in multiple groups with PPG) and multiple forms of gambling in individuals with and without PPG.

Method

Participants and Procedures

Individuals with and without PPG were recruited from the community for research studies with an offer of $75 for participation. Potential participants were included in the present study if they reported any experience gambling in the past and completed assessment of types of gambling behaviors and the NEO-PI-R. Data analyzed in the present study included de-identified responses collected from participants recruited by advertisements in the local community. The study was approved by the Yale Human Investigations Committee.

Measures

Participants were divided into groups via scores on the South Oaks Gambling Screen (SOGS; Lesieur and Blume 1987). The SOGS is a 20-item questionnaire developed to screen for potential problem and pathological gambling. Scores of 3–4 indicate potential problem gambling, and scores of 5 or greater (up to a maximum of 20) indicate PPG. This instrument demonstrated high levels of internal, convergent, and criterion validity in problematic and general populations (see Gambino and Lesieur 2006 for a full review). In the present study, participants were divided into recreational gambling (scores ranging from 0 to 2) and PPG (scores of 5 or higher) groups. The final sample consisted of 248 adults, including 145 recreational gamblers and 103 gamblers with PPG.

Engagement in forms of gambling was assessed via responses to the first item of the SOGS. Participants checked whether they had not at all, less than once a week, or once a week or more gambled in casinos or on cards, animal races, sports, dice, lotteries, bingo, the stock market, slot or poker machines, games of skill, or other forms of gambling. An endorsement was defined as checking any column other than "not at all," such that any positive endorsement indicated that they had ever (as opposed to never) participated in that form.

The personality measure utilized in the current study was the NEO-PI-R (Costa and McCrae 1992). The NEO-PI-R has been generally recommended as the preferred tool in the assessment of the big-five personality factors (John et al. 2008). This 240-item instrument measures agreeableness, conscientiousness, extraversion, neuroticism, and openness personality domain traits. Each domain is assessed with 48 items, and total scores within each domain range from 48 to 240.

Results

Demographic, personality, and gambling activity descriptive statistics and outcomes of bivariate analyses (*t* tests and Chi-square analyses were used to examine between-group differences for continuous and categorical variables, respectively) appear in Table 1. Individuals with PPG were significantly older ($m_{age} = 43.63$ years, $SD = 12.35$) than recreational gamblers ($m_{age} = 31.99$ years, $SD = 10.34$) ($t(246) = -8.048$, $p < .0001$). There were also gender-related differences: the PPG group was comprised of 72.82% male participants, and the recreational gambling group consisted of 60.27% male participants ($X^2 = 4.366$, $p = .037$). No significant differences were found in the distribution of participants' race/ethnicity. Several between-group differences were noted across personality domains. PPG individuals scored lower than recreational gamblers on agreeableness ($t(246) = -3.717$, $p < .001$) and conscientiousness ($t(246) = -4.344$, $p < .001$), and higher on neuroticism ($t(246) = 6.58$, $p < .001$) than did the recreational gambling group. Groups did not differ on extraversion or openness.

Engagement in specific forms of gambling was generally more frequent in individuals with PPG. Compared to recreational gamblers, a higher proportion of those with PPG reported ever betting on cards ($X^2 = 59.978$, $p < .0001$), on animal racing ($X^2 = 34.272$, $p < .0001$), on sports ($X^2 = 45.087$, $p < .0001$), on dice ($X^2 = 34.346$, $p < .0001$), in a casino ($X^2 = 12.731$, $p < .001$), on lotteries ($X^2 = 19.268$, $p < .0001$), and on games of skill ($X^2 = 19.434$, $p < .0001$).

Table 1 Descriptive statistics and bivariate analyses of demographic, personality, and gambling factors

	PPG (SOGS = 5+; n = 103)		Recreational gambling (SOGS < 3; n = 145)		
	Mean	SD	Mean	SD	*p*
Age	43.63	12.35	31.99	10.34	< .0001
Personality domains					
Agreeableness	113.70	16.53	122.14	18.37	< .001
Conscientiousness	111.56	23.21	124.33	22.52	< .0001
Extraversion	112.21	22.43	113.00	19.00	.766
Neuroticism	88.82	20.46	70.61	22.15	< .0001
Openness	111.90	20.82	115.62	19.84	.156
	N	%	*N*	%	*p*
Gender					
Male	75	72.80	87	60.00	.037
Female	28	27.20	58	40.00	
Race/ethnicity					
Caucasian	61	59.20	96	66.20	.261
Other	42	40.80	49	33.80	
Gambling form					
Cards	86	83.50	49	33.79	< .0001
Animal racing	53	51.46	24	16.55	< .0001
Sports	61	59.22	26	17.93	< .0001
Dice	54	52.43	25	17.24	< .0001
Casino	92	89.32	102	70.34	< .001
Lottery	92	89.32	94	64.83	< .0001
Bingo	46	44.66	56	38.62	.341
Stock	25	24.27	24	16.55	.132
Slots	77	74.76	92	63.45	.060
Skill games	52	50.49	34	23.45	< .0001

PPG Probable pathological gambling, *SOGS* South Oaks Gambling Screen

Next, independent samples *t* tests assessed differences in personality domain scores across gambling forms (see Table 2). Individuals who had gambled on cards scored significantly lower on agreeableness, but higher on extraversion and neuroticism compared to those who had not. Those who gambled (vs. those who did not) on animal racing scored lower on conscientiousness and higher on neuroticism. Individuals who gambled on sports (vs. those who did not) scored lower on agreeableness and conscientiousness and higher on neuroticism. Individuals who gambled on dice scored lower on agreeableness and higher on extraversion and neuroticism. Individuals who gambled on bingo scored lower on agreeableness. Individuals who reported gambling on stocks/commodities had lower agreeableness scores, but higher extraversion and openness scores. Last, differences emerged in agreeableness and conscientiousness domains in skill-game betting, with those who had engaged in this form of gambling scoring lower in each domain.

Logistic regression models examined associations between engagement in gambling forms and personality domains. Each model adjusted for age and gender covariates because

Table 2 Mean personality domain scores of individuals who have (yes) and have not (no) engaged in various forms of gambling

Gambling form	Personality domain									
	Agreeableness		Conscientiousness		Extraversion		Neuroticism		Openness	
	Mean	*t*	Mean	*t*	Mean	*t*	Mean	*t*	Mean	*t*
Cards										
Yes	113.80	−5.018†	116.62	−1.924	115.27	2.013*	82.36	3.296**	114.49	.098
No	124.60		122.27		110.17		72.95		114.24	
Animal racing										
Yes	115.81	−1.697	113.11	−2.812**	112.28	−.380	86.05	3.784***	113.51	−.472
No	119.89		121.89		113.32		74.55		114.78	
Sports										
Yes	112.00	−4.648†	112.34	−3.583***	113.41	.250	84.88	3.599***	112.94	−.874
No	122.40		123.03		112.76		74.31		115.21	
Dice										
Yes	111.50	−4.672†	116.00	−1.514	117.02	2.269*	83.71	2.746**	114.81	.245
No	122.17		120.70		110.98		75.39		114.16	
Casino										
Yes	117.69	−1.605	119.69	.728	113.51	.796	78.76	.809	114.10	−.438
No	122.09		117.06		111.04		75.89		115.44	
Lotto										
Yes	119.32	1.109	119.57	.517	112.31	−.945	78.88	.859	113.39	−1.386
No	116.45		117.81		115.08		76.00		117.39	
Bingo										
Yes	115.89	−2.062*	116.81	−1.333	113.44	.294	80.82	1.553	115.51	.763
No	120.54		120.78		112.68		76.28		113.58	
Stocks										
Yes	113.22	−2.503*	118.30	−.294	119.26	2.575*	79.20	.370	119.67	2.193*

Table 2 (continued)

Gambling form	Personality domain									
	Agreeableness		Conscientiousness		Extraversion		Neuroticism		Openness	
	Mean	*t*	Mean	*t*	Mean	*t*	Mean	*t*	Mean	*t*
No	120.04		119.36		111.34		77.89		112.98	
Slots										
Yes	118.49	−.167	120.37	1.241	113.73	.856	78.91	.763	114.08	−.355
No	118.89		116.44		111.40		76.53		115.04	
Skill games										
Yes	111.89	−4.563†	113.60	−2.795**	114.14	.664	82.01	1.959	115.36	.571
No	122.21		122.10		112.38		76.10		113.86	

*$p < .05$; **$p < .01$; ***$p < .001$; †$p < .0001$

of observed differences between groups, the use of a lifetime measure of engagement in gambling forms, and previous indications of gender-related differences in prevalence of gambling (National Research Council 1999) and performance of specific types of gambling (e.g., Potenza et al. 2001). Additional models tested the interactions of PPG status and each personality domain across gambling forms.

The results of the logistic regression analyses are presented in Table 3. Agreeableness ($OR = .971$, $p = .004$) was inversely associated with betting on cards, while extraversion ($OR = 1.019$, $p = .020$) was positively associated with card gambling. Conscientiousness ($OR = .985$, $p = .037$) was inversely associated and neuroticism ($OR = 1.015$, $p = .044$) was positively associated with betting on animal racing. Both agreeableness ($OR = .953$, $p < .001$) and conscientiousness ($OR = .979$, $p = .005$) were inversely associated with sports betting. Agreeableness ($OR = .968$, $p = .001$) was inversely associated with betting on dice games, and extraversion ($OR = 1.017$, $p = .024$) was positively associated with this form of gambling. Agreeableness was inversely associated with bingo gambling ($OR = .983$, $p = .035$). Agreeableness ($OR = .978$, $p = .033$) was inversely associated, and extraversion ($OR = 1.020$, $p = .022$) and openness ($OR = 1.019$, $p = .023$) were positively associated, with stock/commodities gambling. Agreeableness was inversely associated with betting on games of skill ($OR = .972$, $p = .003$). Further, significant interaction effects indicated a stronger inverse association between agreeableness and sports gambling ($OR = .957$, $p = .041$), casino gambling ($OR = .953$, $p = .047$), and skill-game betting ($OR = .953$, $p = .018$) in individuals with PPG compared to those without. Next, the positive association between openness and gambling on stocks/commodities was stronger in those with PPG than those without ($OR = 1.041$, $p = .018$). Last, the positive association between openness and skill-game betting ($OR = 1.035$, $p = .024$) was stronger in those with as compared to without PPG.

Discussion

The present study explored relationships between personality measures and forms of gambling in individuals with and without PPG. The results of the bivariate analyses testing relationships among five-factor personality domains and PPG are generally supportive of the patterns observed in previous research (e.g., Bagby et al. 2007) in that individuals with PPG scored lower on agreeableness and conscientiousness and higher on neuroticism.

The current results extend the literature by exploring relationships among personality domains and gambling forms. The first hypothesis regarding relationships between social gambling and extraversion and agreeableness was supported. Gambling on cards, sports, dice, bingo, and games of skill were inversely related to traits of agreeableness; interaction effects suggested this relationship was more so the case for individuals with PPG relating to sports, casino, and skill-game betting. Because agreeableness is described as a trait tendency to be generally responsive and pleasing in social situations (McCrae and Costa 2003), less agreeable gamblers may tend toward wagering on more impersonal forms (e.g., slot machines or lotteries) and less on social forms (e.g., dice, cards and sports), or when engaging in social forms of gambling, may behave more competitively than agreeable. Extraversion did not differ between recreational gambling and PPG groups, but was positively associated with card, dice and stocks and commodities gambling. As aforementioned, card and dice gambling are typically more social and arguably contain more excitement factors than other forms of gambling. For the stock market, previous research

Table 3 Adjusted odds ratios and 95% CIs for personality domains across gambling forms

Gambling form	Adjusted model				Interaction (PPG vs. recreational gambling)			
	p	Adj OR	95% CI		*p*	Adj OR	95% CI	
Cards								
AGR	.004	.971	.952	.991	.213	.970	.925	1.017
CON	.444	1.005	.992	1.019	.287	.983	.954	1.014
EXT	.020	1.019	1.003	1.036	.395	.986	.953	1.019
NEU	.932	.999	.985	1.014	.599	1.009	.977	1.042
OPEN	.847	1.002	.986	1.017	.809	1.004	.971	1.039
Animal racing								
AGR	.090	.984	.965	1.003	.543	.989	.954	1.025
CON	.037	.985	.971	.999	.188	.981	.952	1.010
EXT	.753	1.002	.987	1.018	.631	.992	.962	1.024
NEU	.044	1.015	1.000	1.030	.415	.988	.959	1.018
OPEN	.488	1.006	.990	1.021	.460	1.012	.981	1.044
Sports								
AGR	< .0001	.953	.932	.976	.041	.957	.917	.998
CON	.005	.979	.964	.994	.587	.992	.962	1.022
EXT	.652	1.004	.988	1.019	.903	1.002	.971	1.034
NEU	.088	1.013	.998	1.028	.327	.985	.956	1.015
OPEN	.653	.996	.981	1.012	.115	1.025	.994	1.058
Dice								
AGR	.001	.968	.949	.988	.743	.994	.957	1.032
CON	.640	1.003	.990	1.016	.283	.986	.960	1.012
EXT	.024	1.017	1.002	1.032	.239	.982	.952	1.012
NEU	.841	1.001	.988	1.015	.959	.999	.972	1.028
OPEN	.644	1.003	.989	1.018	.280	1.016	.987	1.047
Casino								
AGR	.184	.987	.969	1.006	.047	.953	.908	.999
CON	.115	1.012	.997	1.026	.578	.991	.960	1.023
EXT	.358	1.007	.992	1.024	.561	1.010	.976	1.045
NEU	.617	.996	.982	1.011	.226	1.022	.986	1.060
OPEN	.972	1.000	.985	1.016	.423	1.015	.979	1.052
Lotto								
AGR	.456	1.008	.988	1.028	.392	.979	.933	1.028
CON	.672	1.003	.989	1.017	.784	.996	.966	1.027
EXT	.683	.997	.981	1.013	.749	1.006	.971	1.041
NEU	.950	1.000	.985	1.016	.249	1.023	.984	1.063
OPEN	.910	1.001	.985	1.017	.517	.989	.956	1.023
Bingo								
AGR	.035	.983	.968	.999	.371	.986	.956	1.017
CON	.181	.992	.981	1.004	.975	1.000	.977	1.023
EXT	.883	1.001	.988	1.014	.512	.992	.967	1.017
NEU	.189	1.008	.996	1.020	.981	1.000	.975	1.026
OPEN	.344	1.006	.993	1.019	.810	1.003	.978	1.029

Table 3 (continued)

Gambling form	Adjusted model				Interaction (PPG vs. recreational gambling)			
	p	Adj OR	95% CI		*p*	Adj OR	95% CI	
Stocks								
AGR	.033	.978	.959	.998	.187	.974	.937	1.013
CON	.685	.997	.983	1.012	.619	.993	.964	1.022
EXT	.022	1.020	1.003	1.037	.810	.996	.964	1.029
NEU	.979	1.000	.985	1.015	.266	1.018	.987	1.050
OPEN	.023	1.019	1.003	1.036	.018	1.041	1.007	1.076
Slots								
AGR	.549	.995	.978	1.012	.851	.997	.963	1.031
CON	.117	1.010	.998	1.023	.321	.987	.963	1.012
EXT	.222	1.009	.995	1.023	.870	1.002	.975	1.030
NEU	.976	1.000	.987	1.013	.146	1.021	.993	1.051
OPEN	.736	1.002	.989	1.016	.408	1.012	.984	1.040
Skill games								
AGR	.003	.972	.954	.991	.018	.953	.917	.992
CON	.206	.992	.979	1.005	.692	.995	.969	1.021
EXT	.789	1.002	.988	1.016	.894	1.002	.974	1.031
NEU	.640	1.003	.990	1.017	.235	1.017	.989	1.046
OPEN	.629	1.004	.989	1.018	.024	1.035	1.005	1.067

Age and gender variables were included as covariates in all models

PPG Probable pathological gambling, *AGR* agreeableness, *CON* conscientiousness, *EXT* extraversion, *NEU* neuroticism, *OPEN* openness

suggested that extraversion is related to short-term investing (Mayfield et al. 2008) characterized by possibilities of quick payoffs and large gains. Thus, one might expect that these forms of gambling may attract more extraverted individuals.

The second hypothesis, that gambling forms (except strategic forms) would be inversely associated with conscientiousness, also found support. Conscientiousness was either unrelated or inversely related to all forms. Previous research has suggested an inverse relationship between conscientiousness and PPG (Bagby et al. 2007), and this pattern was replicated in the present study. However, conscientiousness was not inversely related to every form of gambling. The present results suggest highly conscientious individuals are unlikely biased to any particular form of gambling, but may less likely engage in betting on animal racing and sports.

The third hypothesis regarding differential relationships between neuroticism and forms of gambling in those with PPG was not supported. In bivariate analysis, neuroticism was higher in individuals who gambled on cards, animal racing, sports, and dice, and as being overall higher in individuals with PPG than in recreational gamblers. However, in adjusted logistic regression models, neuroticism was only associated with gambling on animal racing, and analyses found no differences between recreational gamblers and individuals with PPG on any specific gambling activity. Null associations with casino, lottery, and slot-machine gambling may reflect high rates of engagement

in these activities across all individuals (80%, 75%, and 70%, respectively). Together, these results suggest that neuroticism may be characteristic of individuals who engage in general gambling behavior rather than in any specific form. Individuals with high neuroticism have shown a greater tendency to develop psychopathology (Costa and McCrae 1992), and thus may be more attracted to classes of addictive behaviors, such as gambling. This assertion is supported by previous research which found that negative affect and impulsivity, two facets of neuroticism, may function as risk factors for PPG (Dixon et al. 2006; MacLaren et al. 2011a), and that individuals with PPG generally demonstrate higher levels of neuroticism than those without PPG (Alessi and Petry 2003; Bagby et al. 2007; Myrseth et al. 2009; Yan et al. 2016; Potenza et al. 2003). Similarly, because of the greater tendency for individuals with high neuroticism to develop psychopathology, models that incorporate co-occurring psychiatric diagnoses in addition to personality variables such as that by Vachon and Bagby (2009) may be useful in examining why individuals choose particular gambling activities.

Due to limitations, the results should be interpreted with caution. First, engagement in each gambling form was scored as a lifetime measure via the SOGS, so some of the endorsed gambling activity may have occurred long ago or with minimal frequency. Also, those greater in age would have likely had more opportunity to engage in any of the gambling forms under examination. Though analyses adjusted for age, the data should be interpreted cautiously due to the use of a lifetime measure. Second, the study may be considered exploratory in nature, and limitations inherent in exploratory analyses apply. Due to limitations imposed by the size of the present sample and the exploratory nature of the analyses, each personality domain was tested individually as a predictor of each form of gambling in a separate model. A large number of statistical tests inflated the probability of false-positive results, and all data collected were self-reported and subject to bias. Third, given that only 35% of the sample was female, the results may not generalize to female gamblers.

Despite these limitations, the results have multiple implications for future study and treatment of gambling disorder. First, current findings support the notion that gamblers are a heterogeneous group, and that all will not fit one overarching gambling personality. With differences in personality measures across gambling forms, generalized treatment efforts may be less likely to work with any given gambler (Ladouceur et al. 2009). Future efforts identifying how specific forms of gambling interact with specific personalities may be important in advancing prevention and treatment efforts. For example, the association between openness (i.e., willingness to try new things) and skill and stock market gambling (two of the more rarely endorsed gambling forms) was significantly stronger in individuals with PPG than in recreational gamblers, so clinicians may wish to target more abstract forms of gambling in treatment or monitor for gambling to re-allocate to novel forms in individuals high in openness. Similarly, because engagement in more social forms of gambling inversely related to agreeableness (and more so for individuals with PPG), it is possible that arranging for additional peer support may bolster intervention success for individuals high in agreeableness. Second, future research should examine why only a small percentage of individuals develop gambling problems despite more prevalent interest in gambling and examine the possible influences of other potentially operative factors of gambling forms including but not limited to risk and monetary outcomes. Last, research in personality may allow for enhanced discrimination of disordered gambling. Very few in situ indicators of disordered gambling have been identified. As the NEO instruments may accurately predict peer ratings (DeYoung 2006), research into personality and behavioral indicators of disordered gambling may increase capability to identify and intervene in disordered gambling behavior when it is occurring.

In sum, the results of this exploratory study support previous research that individuals with PPG generally possess greater neuroticism and lower agreeableness and conscientiousness traits, and further suggest that personalities relate differently to specific forms of gambling, and these relationships may differ according to problem-gambling severity. Further study is required to determine whether and how personality characteristics may be used to identify disordered gambling and advance prevention and treatment efforts.

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Compliance with Ethical Standards

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