Personality correlates of pathological gambling derived from Big Three and Big Five personality models

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Abstract

Personality traits have proven to be consistent and important factors in a variety of externalizing behaviors including addiction, aggression, and antisocial behavior. Given the comorbidity of these behaviors with pathological gambling (PG), it is important to test the degree to which PG shares these trait correlates. In a large community sample of regular gamblers (*N*=354; 111 with diagnoses of pathological gambling), the relations between measures of two major models of personality – Big Three and Big Five – were examined in relation to PG symptoms derived from a semi-structured diagnostic interview. Across measures, traits related to the experience of strong negative emotions were the most consistent correlates of PG, regardless of whether they were analyzed using bivariate or multivariate analyses. In several instances, however, the relations between personality and PG were moderated by demographic variable such as gender, race, and age. It will be important for future empirical work of this nature to pay closer attention to potentially important moderators of these relations.

Keywords

1. Introduction

The study of externalizing behavior from the perspective of personality has yielded valuable data regarding the correlates of substance use, aggression, and antisocial behavior (e.g., Jones et al., 2011; Kotov et al., 2010). Meta-analyses suggest that personality traits related to neuroticism, impulsivity, and antagonism are the largest and the most consistent of externalizing behaviors. The personality literature on pathological gambling (PG) is at a more nascent stage, at least compared to the literature on the aforementioned externalizing behaviors with which PG tends to be comorbid (e.g., Petry et al., 2005). The comorbidity of PG with these behaviors, particularly substance use and abuse, has resulted in a significant change in how PG will be categorized in the official diagnostic nosology. Pathological gambling, which is described in the Diagnostic and Statistical Manual of Mental Disorders-4th Edition (DSM-IV-TR; APA, 2000) as a pattern of "persistent and recurrent maladaptive gambling behavior that disrupts personal, family, or vocational pursuits" (p. 671) is classified in the DSM-IV-TR as an "Impulse-Control Disorder." This is likely to change in the DSM-5 (www.dsm5.org) such that PG is set to be included in the "Substance Use and Addictive Disorders" category.

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Although there are potential advantages and disadvantages of this change (Petry, 2006), one benefit is that it is likely to result in a substantial increase in the study of PG from a variety of perspectives, including an examination of PG's personality correlates. Work of this nature is currently ongoing in the area of PG; a recent meta-analysis (MacLaren et al., 2011) found that traits related to neuroticism, disagreeableness, and disinhibition are among the most consistent personality correlates of PG. The authors of this meta-analysis suggest that the personality profile associated with PG is consistent with that found for substance use and other externalizing disorders. Similarly, research by Slutske et al. (2005) found that personality traits can help explain the statistical covariance between PG and substance use disorders. Findings such as these lend credence to the movement of PG from an impulse-control disorder to a category encompassing addictive disorders.

One limitation of the extant research on personality and PG is that many of the studies have relied on a single operationalization of personality such as measures of the Five-Factor Model (e.g., Bagby et al., 2007), Cloninger's seven-factor temperament and character model (e.g., Janiri et al., 2007), Tellegen's three-factor model (King et al., 2010) or Eysenck's three-factor model (e.g., Blanco et al., 2001). Although these models can be integrated in meaningful ways (Markon et al., 2005), it is advantageous to study these relations using more than one measure of personality simultaneously, so as to ensure that findings are not specific to a given assessment.

A second limitation of many existing personality-based examinations of PG is the focus on the bivariate associations between personality traits and PG. The failure to examine the relations between personality domains and PG simultaneously makes it impossible to examine the unique relations between personality and PG. This is particularly important given that many of the domains from most major models of personality tend to manifest some degree of inter-relation. For instance, the Five-Factor Model (FFM) domains, as assessed by the Revised NEO Personality Inventory (Costa and McCrae, 1992) manifested correlations that ranged from −0.53 (Neuroticism–Conscientiousness) to 0.40 (Extraversion–Openness) in the data set used to develop norms for this instrument. The degree of overlap found among many traits may obscure the manner in which these traits are related to PG.

Finally, there has been little attention paid to moderators of the relations between personality and PG. This is unfortunate as the relations between personality and important clinical outcomes have been found to vary based on a number of factors including sample characteristics and assessment strategies (e.g., Jones et al., 2011; Samuel and Widiger, 2008). It is likely that the relations between personality and PG may be significantly stronger or weaker in the context of other variables such as gender, race, treatment status, and psychiatric comorbidity.

In the current study, we sought to address each of these issues. We examined the relations between personality and PG using two measures of the Big Five/FFM model of personality and an operationalization of Tellegen's three-factor model, which assesses three broad domains of negative emotionality, positive emotionality, and constraint, as well as 11 narrower subscales. In general, measures of these two models overlap substantially with significant convergence between Tellegen's negative emotionality factor and FFM neuroticism and antagonism, Tellegen's positive emotionality domain and FFM extraversion, and Tellegen's constraint domain and FFM conscientiousness (see Gaughan et al., 2009). We first examined the bivariate relations among these personality traits and PG with the expectation that traits related to negative emotionality/neuroticism, disconstraint, and disinhibition would manifest significant correlations. Second, we used exploratory factor analysis (EFA) to derive personality factors found across the three measures and examined the bivariate and unique relations between the EFA factors and PG. Finally, we

examined whether the relations between personality and PG were moderated by three demographic variables: gender, race, and age.

2. Method

2.1. Participants

Participants included 368 frequent gamblers (i.e., gambled at least weekly), who were recruited using newspaper advertisements and word of mouth. Participants were excluded from the following analyses for lack of effort, inadequate familiarity with computers, and missing large portions of data; these exclusions resulted in total sample of 354. The majority of participants were male (78%) with a mean age of 35.3 (S.D.=12.2; range: 18–64) who primarily self-identified as Caucasian (52%) or African American (43%). Eighty one percent of the sample reported attending school for 12 or more years. Across gambling modalities, individuals endorsed the highest weekly frequencies for gambling via the lottery, followed by card games, betting on sports, and the use of slot machines.

2.2. Procedure

Potential participants first completed a phone screen to determine eligibility. Individuals were excluded from participation if they did not gamble at least once a week, currently lived with someone who already completed the study, could not use a computer, reported psychotic symptoms, were younger than 18 or older than 65.

After completing informed consent, participants completed a diagnostic interview for PG, as well as a variety of self-report questionnaires. Participants were paid $30 for their participation. Following payment, participants were debriefed and informed of local treatment resources available to gamblers. All procedures were approved by the University of Georgia Institutional Review Board.

2.3. Measures

2.3.1. Structured Clinical Interview for Pathological Gambling (SCI-PG)—The SCI-PG (Grant et al., 2004) is a semi-structured interview that assesses participants' current and heaviest gambling periods. In this study, current SCI-PG scores were used (M=3.24; S.D.=2.84; a=0.88). One hundred and eleven individuals met criteria for a DSM-IV diagnosis of PG.

2.3.2. NEO Five-Factor Inventory (NEO-FFI)—The NEO-FFI (Costa and McCrae, 1992) is a 60-item measure of the Five-Factor Model of personality. Twelve items are used to asssess each of the following domains: Neuroticism, Extraversion, Openness to experience, Agreeableness, and Conscientiousness. Coefficient alphas in the current study ranged from 0.67 (Openness) to 0.81 (Neuroticism).

2.3.3. Big Five Inventory (BFI)—The BFI (John et al., 1991) is a 44-item measure of the Big Five domains that are largely congruent with those posited in FFM. In the current study, alpha coefficients ranged from 0.73 (Extraversion) to 0.82 (Neuroticism).

2.3.4. Multidimensional Personality Questionnaire-Brief Format (MPQ-BF)— The MPQ (Patrick et al., 2002) is a 155-item, self-report inventory that assesses 11 personality trait scales and three broad personality domains (i.e., Positive Emotionality, Negative Emotionality, Constraint) included in Tellegen (in press) model. In this study, alpha coefficients for the 11 traits ranged from 0.65 (Harm Avoidance) to 0.87 (Stress Reaction) and from 0.79 (Constraint) to 0.91 (Negative Emotionality) for the domains.

2.3.5. Shipley Institute of Living Scale—Shipley Institute of Living Scale (Zachary, 1991) is a measure of intelligence, which consists of two brief subtests that assess vocabulary and abstract reasoning. Shipley scores are strongly correlated with scores from longer measures of intelligence (e.g., Matthews et al., 2011). The mean raw Shipley score in this sample was 50.59 (S.D.=15.6). Using an algorithm designed by Zachary et al. (1985), this Shipley score corresponds to a mean WAIS-R IQ of 90.38.

3. Results

3.1. Correlations among personality measures and pathological gambling

A p-value of <0.01 was used for all tests of statistical significance except for tests of moderation, which tend to be underpowered. For these analyses, a p-value of <0.05 was used so as to lower the probability of making type II errors. The two sets of domains from the measures of the Big Five and FFM manifested significant convergence with correlations ranging from 0.46 (Openness) to 0.79 (Neuroticism), with a median of 0.68 (see Table 1). In all cases, the convergent validity correlations (e.g., BFI Neuroticism–NEO-FFI Neuroticism) were larger than the off-diagonal correlations (e.g., BFI Neuroticism–NEO-FFI Conscientiousness). The measures of the Big Five/FFM also manifested similar correlations with the MPQ domains and subscales. At the domain level, BFI and NEO-FFI Neuroticism manifested their largest correlations with MPQ Negative Emotionality. BFI and NEO-FFI Extraversion manifested their largest domain level correlations with MPQ Positive Emotionality. FFI Openness manifested its strongest correlation (negatively valenced) with MPQ Constraint, whereas BFI Openness manifested its largest correlation with the domain of Positive Emotionality. BFI and NEO-FFI Agreeableness manifested their largest correlations (negatively valenced) with the domain of Negative Emotionality. Finally, BFI and NEO-FFI Conscientiousness manifested their largest correlations with the domain of Constraint.

The largest correlations between the personality traits and symptoms of PG were with the domains of Neuroticism (BFI: r=0.20; NEO-FFI: r=0.25) and Negative Emotionality (r=0.27), as well as Negative Emotionality subscales of Stress Reaction (r=0.29) and Alienation (r=0.26). The NEO-FFI domains of Openness and Agreeableness also manifested small but statistically significant negative correlations with PG. The MPQ subscales of Well-Being and Social Closeness manifested small but significant negative correlations with PG, whereas the Traditionalism facet manifested a small but significant positive correlation with PG. The domains from the three measures accounted for between 4% (BFI) and 7% (NEO-FFI; MPQ) of the variance in PG symptoms (adjusted for differing number of factors in the models).

3.2. Factor structure of the three and five-factor personality measures

In order to derive factor scores that combined data from the three personality inventories, we conducted an EFA using principal axis factoring with an oblimin rotation on the BFI domains, NEO-FFI domains, and MPQ subscales. The EFA resulted in five eigenvalues with values of 1.0 or greater and a scree plot suggestive of five factors; the first six eigenvalues were as follows: 5.36, 3.41, 2.34, 1.51, 1.27, and 0.92. Parallel Analysis (PA; Horn (1965)) and the Minimum Average Partial (MAP; Velicer (1976)) methods were used to identify the number of factors to extract. PA suggested that up to eight factors could be extracted (although the eigenvalues for factors 6 through 8 were similar in size to the eigenvalues from randomly generated data), whereas the MAP analyses suggested that five factors should be extracted. The first five factors explained 66.17% of the variance (see Table 2 for factor loadings).

The first factor comprised negative factor loadings from both BFI and NEO-FFI Neuroticism as well as MPQ subscales of Stress Reaction and Alienation; this factor (reversed) was labeled *neuroticism*. The second factor comprised negative loadings of BFI and NEO-FFI Agreeableness and positive loadings of MPQ subscales of Aggression and Social Potency; this factor (reversed) was labeled *agreeableness*. The third factor comprised positive loadings for BFI and NEO-FFI Conscientiousness and MPQ sub-scales of Achievement and Control; this factor was labeled *conscientiousness*. The fourth factor comprised factor loadings of BFI and NEO-FFI Openness and MPQ Absorption, as well as a negative loading from MPQ Traditionalism; this factor was labeled *openness*. Finally, the fifth factor comprised factor loading from BFI and NEO-FFI Extraversion, as well as MPQ subscales of Social Closeness, Social Potency, and Well-Being; this factor was labeled *extraversion*. The factors manifested correlations ranging from −0.33 (neuroticism–agreeableness) to 0.40 (extraversion–openness).

3.3. Correlations among EFA personality factors and PG

We next examined the relations between the five EFA personality factors and PG (see Table 3). At the bivariate level, four of the factors manifested small but significant correlations with PG, including a positive correlation for neuroticism and negative correlations for extraversion, openness, and agreeableness. When examined simultaneously, only neuroticism and openness manifested unique relations with PG. Overall, the five factors accounted for 9% of the variance in PG.

Given the somewhat unexpected finding of both bivariate and unique relations between the openness factor and PG, we investigated whether this finding might be due to the overlap between this personality domain and intellectual functioning, which is a known correlate of PG (Forbush et al., 2008). IQ was correlated with PG in the current sample (−0.30) and was significantly correlated with the following EFA factors: neuroticism (−0.30), extraversion (0.21), openness (0.39), and agreeableness (0.17). To examine the role of intelligence, PG was regressed on IQ at step 1 and the five EFA factors at step 2. The unique relation between neuroticism and PG remained (β=−0.21, $p < 0.01$) but the same was not true for openness (β= −0.06, *ns*).

3.4. Moderators of the relations between personality and PG

Three potential moderators of the personality–PG correlations were examined: gender, race, and age. Interaction terms were created by multiplying each personality factor with gender (0=males; 1=females), race (0=Caucasian; 1=African American) and age (centered), separately. In terms of main effects, both gender (r=0.17, $p < 0.01$) and race (r=0.21, $p < 0.01$) manifested small significant correlations such that women and African Americans had higher rates of PG symptoms; age was not significantly correlated with PG (r=0.09). Individual regression analyses were conducted in which PG was regressed on one of the personality factors and gender, race, or age at step 1, and the cross-product term at step 2 (e.g., neuroticism*age). With regard to *gender*, only openness manifested a significant interaction, which accounted for an additional 2% of the variance. An examination of the simple slopes revealed that the relation between openness and PG was significantly negative for men (β= −0.18, $p < 0.01$) but positive and nonsignificant for women (β=0.17, *ns*). With regard to *race*, only the interaction term for conscientiousness approached the traditional cut-off for statistical significance. The interaction term between conscientiousness and race accounted for an additional 1% of the variance ($p < 0.08$) and operated such that the relation between conscientiousness and PG was nonsignificant for Caucasians (β= −0.01, *ns*) but significant and negative for African Americans (β= −0.21, $p < 0.05$). With regard to age, two personality factors manifested statistically significant interactions: extraversion (ΔR^2=0.01) and conscientiousness (ΔR^2=0.02). Extraversion was significantly negatively

related to PG at 1 S.D. above the mean for age (i.e., 47.6 years old; $\beta= -0.24$, $p < 0.01$) but was unrelated to PG at 1 S.D. below the mean for age (i.e., 23.1 years old; $\beta=0.00$, *ns*). Conscientiousness was not significantly related to PG at 1 S.D. above the mean for age ($\beta=0.09$, *ns*) but was significantly negatively related to PG at 1 S.D. below the mean for age ($\beta= -0.20$, $p < 0.01$).

4. Discussion

A growing literature has begun to document the relations between general personality traits and PG with the suggestion that domains related to neuroticism, disinhibition, and interpersonal antagonism are among the most reliable correlates (MacLaren et al., 2011). These traits are similar to those related to other externalizing behaviors (e.g., Jones et al., 2011; Kotov et al., 2010), as well as personality disorders related to these behaviors such as antisocial and borderline personality disorder (Samuel and Widiger, 2008). The evidence also suggests that personality accounts for some of the covariance between PG and substance abuse disorders (Slutske et al., 2005).

One important limitation of the prior research on the personality correlates of PG is that these relations have often been examined solely from a bivariate perspective. The failure to account for the overlap among many personality traits may make it appear as if there are a larger number of substantive trait correlates of PG than exist when examining the unique variance shared by these traits with PG. For example, Myrseth et al. (2009) examined the bivariate and multivariate relations between the FFM and PG status. Examined alone, each of the FFM domains differentiated between a group of pathological gamblers and a control group. When examined simultaneously, along with demographic variables and variables related to impulsivity, only FFM neuroticism and openness remained significant. These findings largely mirror those reported here; examined using bivariate analyses, four of the five EFA-derived traits were related to PG. However, when considered simultaneously, only neuroticism and openness manifested significant unique relations with PG. The fact that extraversion and agreeableness were not unique correlates of gambling when controlling for the other traits is most likely a reflection of the fact that these traits are not orthogonal (median correlation among the five EFA factors= |0.20|).

The significant relations found between traits associated with neuroticism and PG in the current sample are consistent with the extant literature on PG (MacLaren et al., 2011). Blaszczynski and Nower (2002) have argued that there is a subset of pathological gamblers termed "emotionally vulnerable problem gamblers" for whom "gambling is motivated by a desire to modulate affective states and/or meet specific psychological needs" (p. 492). As such, gambling may be, like many other behaviors including substance use, binge-eating/purging, risky sex, or even non-suicidal self-injury, a maladaptive strategy for coping with the negative affect. Such strategies may yield short-term improvements in negative affect but at the cost of longer-term dysfunction. This pathway is consistent with work by Stewart and Zack (2008a), and Stewart et al. (2008b) that suggests coping motivations are important correlates of gambling and gambling pathology. A second pathway exists through which negative affect might be related to PG. From an FFM perspective, individuals with higher scores on neuroticism experience difficulty inhibiting urges or cravings, particularly when experiencing negative affect. This trait, which has since been labeled (negative) urgency (Whiteside and Lynam, 2001), is a particularly strong correlate of PG (MacLaren et al., 2011) and a number of similar behaviors including non-suicidal self-injury (Lynam et al., 2011), pathological eating and drinking (Fischer et al., 2004), and antisocial behavior (Jones et al., 2011). A third possibility is that elevated trait scores on measures of neuroticism may be, in part, an outcome of PG such that the financial and interpersonal consequences of PG (e.g., Lorenz and Yaffee, 1988) lead to increases in negative affect that manifest themselves

on trait measure of neuroticism. Although this may be the case in some instances, Slutske et al. (2005) demonstrated that trait negative emotionality assessed at age 18 predicted gambling at age 21. It is possible that the relation between neuroticism and PG is bidirectional in nature, however, such that neuroticism increases the likelihood of PG and PG increases neuroticism over time.

The current study also found evidence for a small but significant negative relation between the openness factor and PG. Although a relation between openness and PG has been found before (e.g., Myrseth et al., 2009), its relations have been inconsistent (e.g., Bagby et al., 2007). The most parsimonious explanation for a significant openness–PG correlation may have to do with this trait's relation to intelligence. Openness tends to be significantly positively correlated with IQ scores (Ackerman and Heggestad, 1997), as it was in the current study, and negatively related to PG (e.g., Forbush et al., 2008). In the current sample, the openness factor was no longer significantly related to PG once the variance it shared with IQ was taken into account. Thus, in these analyses, it appears that openness was largely serving as a proxy for intelligence.

This study is also one of the first to examine and demonstrate that the relations between personality and PG may be moderated by demographic factors such as gender, race, and age. For instance, openness manifested divergent relations with PG for men (negative) and women (positive). This is consistent with some past research findings that gender moderates the relations between PG and other psychiatric disorders such as depression (Desai and Potenza, 2008), as well as the motivations for gambling (e.g., Blanco et al., 2006). In addition, several other instances of moderation were found such that the relations between personality and PG were affected by race (i.e., conscientiousness was related to PG only among African Americans) and age (i.e., extraversion was negatively related to PG only among older participants; conscientiousness was negatively related to PG only among younger participants). It will be important that future studies establish the robustness of these relations via replication and test whether these personality and gambling relations are contingent upon other factors. Potential moderators that might be examined, in addition to demographic variables examined here, include treatment status, gambling modality, comorbid psychiatric disorders, and motives for gambling. In order to do this, investigators should make concerted efforts to collect diverse samples that have sufficient variability to test the moderating role of these factors and have sufficient statistical power to detect these effects if present.

4.1. Limitations and conclusions

The current study had a number of methodological strengths including the use of a large, diverse community sample of gamblers, multiple well-validated measures of personality, and a semi-structured diagnostic interview of PG. There were also limitations including the reliance on self-report personality data. It will be helpful for future studies to examine these relations using informant reports of personality. In addition, the data were all collected concurrently, which precludes examination of the temporal ordering of the relations between personality and PG (cf. Slutske et al., 2005). Longitudinal studies on the relations between personality and PG can help explicate the nature of these relations, particularly the manner in which neuroticism and PG relate to one another across time. This is an area of high priority for gambling research where there have been relatively few longitudinal studies examining the etiology of PG. Finally, the moderating effects of gender should be interpreted with some caution as the sample comprised significantly more males than females.

In sum, across three well-validated measures of personality, traits related to the tendency to experience strong negative emotions were the strongest correlates of PG. Further work is

needed to examine the role of these traits in the development and maintenance of PG. The relations between personality and PG may also be contingent upon a variety of factors, however, including gender, race, and age. Future studies should attend more closely to the variables that moderate these relations as this has been a largely ignored area of research. Samples that are both large and diverse will be required so that moderator analyses of this sort can be undertaken in a statistically valid manner.

Acknowledgments

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Table 1

Correlations among 3- and 5-factor models of personality and symptoms of pathological gambling (PG).

	PG	Neuroticism		Extraversion		Openness		Agreeableness		Conscientiousness	
		NEO-FFI	BFI	NEO-FFI	BFI	NEO-FFI	BFI	NEO-FFI	BFI	NEO-FFI	BFI
PG		0.25		−0.13		−0.14		−0.14		−0.10	
BFI											
Neuroticism	0.20	**0.79**		−0.38		−0.12		−0.28		−0.29	
Extraversion	−0.08	−0.31		**0.68**		0.23		0.02		0.25	
Openness	−0.12	−0.10		0.41		**0.46**		0.03		0.28	
Agreeableness	−0.11	−0.32		0.28		0.03		**0.64**		0.43	
Conscientiousness	−0.09	−0.38		0.25		−0.09		0.29		**0.73**	
MPQ											
Positive emotionality	−0.12	−0.34	−0.43	**0.66**	**0.63**	0.25	**0.36**	−0.03	0.15	0.28	0.26
Well – being	−0.14	−0.30	−0.38	0.56	0.47	0.27	0.31	−0.01	0.14	0.20	0.19
Social potency	−0.04	−0.20	−0.28	0.47	0.56	0.25	0.33	−0.26	−0.10	0.13	0.10
Achievement	−0.01	−0.19	−0.20	0.23	0.21	0.03	0.23	−0.02	0.12	0.44	0.45
Social closeness	−0.15	−0.23	−0.32	0.55	0.47	0.14	0.12	0.22	0.26	0.02	−0.01
Negative emotionality	0.27	**0.60**	**0.61**	−0.19	−0.16	−0.08	−0.02	**−0.53**	**−0.45**	−0.24	−0.29
Stress reaction	0.29	0.70	0.73	−0.28	−0.26	−0.06	−0.04	−0.32	−0.32	−0.24	−0.29
Alienation	0.26	0.50	0.47	−0.15	−0.12	−0.16	−0.03	−0.44	−0.30	−0.12	−0.15
Aggression	0.07	0.19	0.22	0.01	0.03	0.04	0.03	−0.55	−0.48	−0.22	−0.24
Constraint	0.03	−0.02	−0.08	−0.16	−0.13	**−0.37**	−0.07	0.25	0.35	**0.35**	**0.43**
Control	−0.13	−0.19	−0.23	−0.05	−0.08	−0.13	0.10	0.25	0.35	0.35	0.45
Harm avoidance	0.03	0.08	0.03	−0.21	−0.15	−0.30	−0.11	0.22	0.23	0.17	0.22
Traditionalism	0.20	0.12	0.08	−0.09	−0.05	−0.38	−0.15	0.03	0.13	0.19	0.21
Absorption	0.00	0.16	0.15	0.09	0.07	0.31	0.29	−0.14	−0.03	0.00	−0.01

Correlations > 0.14 are significant at $p < 0.01$. Bolded correlations represent the strongest correlations among each the Big Five/FFM traits scales and the MPQ *domains*; underlined correlations represent the strongest correlations among each the Big Five/FFM traits scales and the MPQ *subscales*. BFI=Big Five Inventory; MPQ=Multidimensional Personality Questionnaire.

Table 2

EFA of Big Three and Big Five trait scales.

	Factor				
	1	**2**	**3**	**4**	**5**
BFI					
Neuroticism	**−0.75**	−0.03	−0.24	0.00	−0.19
Extraversion	0.04	0.06	0.09	0.04	**0.74**
Openness	−0.16	−0.15	0.32	**0.54**	0.22
Agreeableness	−0.02	**−0.72**	0.26	0.09	0.22
Conscientiousness	0.15	−0.18	**0.82**	−0.02	−0.02
NEO-FFI					
Neuroticism	**−0.80**	−0.05	−0.26	−0.05	−0.05
Extraversion	−0.01	−0.05	0.07	0.06	**0.82**
Openness	0.03	−0.09	−0.10	**0.86**	0.00
Agreeableness	0.10	**−0.76**	0.02	0.05	0.07
Conscientiousness	0.07	−0.18	**0.70**	−0.05	0.11
MPQ					
Well-being	0.10	0.14	0.19	0.16	**0.49**
Social potency	0.12	0.43	0.15	0.09	**0.49**
Achievement	0.05	0.16	**0.56**	0.05	0.09
Social closeness	0.07	−0.21	−0.27	−0.11	**0.75**
Stress reaction	**−0.78**	0.10	−0.08	0.06	−0.11
Alienation	**−0.59**	0.35	0.16	−0.14	−0.02
Aggression	−0.16	**0.64**	−0.01	0.00	0.05
Control	0.13	−0.24	**0.44**	−0.08	−0.15
Harm avoidance	−0.09	−0.33	0.14	−0.32	−0.10
Traditionalism	−0.25	−0.04	0.28	−0.39	0.04
Absorption	−0.36	0.09	0.19	0.37	0.03
Factor correlations					
Factor 2	−0.33				
Factor 3	0.07	−0.19			
Factor 4	0.06	0.21	0.01		

Factor				
1	**2**	**3**	**4**	**5**
Factor 5	0.31	0.04	0.28	0.40

Primary factor loadings of 0.35 or higher are bolded. Secondary factor loading of 0.35 or higher are underlined. BFI=Big Five Inventory; NEO-FFI=Five-Factor Inventory MPQ=Multidimensional Personality Questionnaire.

Table 3

Relations between EFA extracted factors and symptoms of PG.

	r	β	R^2
F1: Neuroticism	0.28[*]	0.25[*]	
F5: Extraversion	−0.14[*]	0.00	
F4: Openness	−0.15[*]	−0.15[*]	
F2: Agreeableness	−0.12[*]	−0.07	
F3: Conscientiousness	−0.04	−0.01	
			0.09[*]

Standardized regression coefficients (βs) are from a simultaneous regression analysis in which PG symptoms were regressed on the five EFA factors.

[*]
$p < 0.01$.