



The relationship of DSM-IV pathological gambling to compulsive buying and other possible spectrum disorders: Results from the Iowa PG family study

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ABSTRACT

This study investigates the possible relationship between pathological gambling (PG) and potential spectrum disorders including the DSM-IV impulse control disorders (intermittent explosive disorder, kleptomania, pyromania, trichotillomania) and several non-DSM disorders (compulsive buying disorder, compulsive sexual behavior, Internet addiction). PG probands, controls, and their first-degree relatives were assessed with instruments of known reliability. Detailed family history information was collected on relatives who were deceased or unavailable. Best estimate diagnoses were assigned blind to family status. The results were analyzed using logistic regression by the method of generalized estimating equations. The sample included 95 probands with PG, 91 controls, and 1075 first-degree relatives (537 PG, 538 controls). Compulsive buying disorder and having “any spectrum disorder” were more frequent in the PG probands and their first-degree relatives vs. controls and their relatives. Spectrum disorders were significantly more prevalent among PG relatives compared to control relatives (adjusted OR=8.37), though much of this difference was attributable to the contribution from compulsive buying disorder. We conclude that compulsive buying disorder is likely part of familial PG spectrum.

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1. Introduction

The concept of a familial spectrum of disorders emerged in the 1970s. The schizophrenia spectrum was embraced by the psychiatric community and has influenced classification of these disorders in DSM-5 (American Psychiatric Association, 2013). Likewise, the obsessive-compulsive spectrum was identified in the 1990s and has since been accepted by the field, influencing the authors of DSM-5 who included a chapter on obsessive-compulsive and related disorders (Hollander, 1993; American Psychiatric Association, 2013; Black and Grant, 2014). In each instance, evidence from family and twin studies, as well as patterns of familial aggregation of disorders and psychiatric comorbidity, led investigators and clinicians to conclude that other conditions were related to the disorder in question (e.g., schizotypal personality disorder and schizophrenia, body dysmorphic disorder and obsessive-compulsive disorder). The spectrum concept has offered researchers and clinicians a new way to think about the relationship among disorders in terms of

phenomenology and treatment, and to reconsider the idea of phenotypic expression, a central issue in genetic studies.

The concept of a spectrum of disorders related to PG has been slower to gain support. The possibility is of great theoretical interest and is suggested by both clinical experience and theory (Black et al., 2010). An array of behaviorally-defined conditions potentially related to PG includes compulsive buying disorder, compulsive sexual behavior (sexual addiction), kleptomania, and Internet addiction. These conditions overlap with the “externalizing” disorders whose main feature is behavioral dyscontrol that places the individual in conflict with other persons or society (Black et al., 2014).

In DSM-IV (American Psychiatric Association, 1994), PG was placed in the chapter on impulse control disorders not elsewhere classified. The category included several orphan disorders characterized by loss of control of one's behavior resulting in explosive temper outbursts, stealing, firesetting, or excessive gambling. In an earlier communication (Black et al., 2014), we presented the major findings of the Iowa family study of PG. We showed that PG is familial, but also that these same families are filled with substance misuse and antisocial personality disorder, providing partial confirmation to the concept of a PG spectrum.

We now present further results from the Iowa PG family study. We report data testing the relationship between several DSM-IV

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disorders considered by some to be related to PG (intermittent explosive disorder, kleptomania, pyromania, and trichotillomania), but also several non-DSM-IV disorders that are of theoretical interest (compulsive buying disorder, compulsive sexual behavior, and Internet addiction) (Comings, 1998; Dannon et al., 2004; Hollander et al., 2006; Black et al., 2010; Aboujaoude, 2010; Grant and Odlaug, 2012). These latter conditions have been called “behavioral addictions,” that is, disorders characterized by uncontrolled (or poorly controlled) behaviors not due to the use of alcohol or other drugs. The National Institute on Drug Abuse considers behavioral addictions relatively pure models of addiction because they are uncontaminated by the presence of an exogenous substance (Holden, 2001). In DSM-5, PG was moved to the chapter on substance use and other addictive disorders in partial recognition of the subcategory of behavioral addictions (American Psychiatric Association, 2013).

With this background in mind, we shall focus on the status of PG and potential spectrum disorders. First, we examine their prevalence in PG probands and controls. Next, we examine their prevalence in their respective first-degree relatives. Finally, we examine whether the conditions occur more frequently in PG relatives whether or not the case proband had the same diagnosis.

2. Methods

2.1. Participants

PG probands were recruited through a study registry ($n=19$); psychiatric treatment facilities ($n=15$); gambling treatment programs ($n=19$); advertisements ($n=19$); Gamblers Anonymous meetings ($n=15$); and word-of-mouth ($n=7$). Controls were recruited via random digit dialing through the Center of Social and Behavioral Research at the University of Northern Iowa (Cedar Falls, IA). They were group matched to PG subjects for age (within 5 years), sex, and educational level.

Probands were interviewed between February 2005 and June 2010. PG probands were required to have a South Oaks Gambling Score (SOGS; Lesieur and Blume, 1987) ≥ 5 and a National Opinion Research Center DSM Screen for Gambling Problems (NODS; National Opinion Research Center at the University of Chicago (NORC), 1999) score ≥ 5 ; they also had to meet DSM-IV PG criteria (American Psychiatric Association, 1994). The SOGS is a screener used to identify likely cases of PG. The NODS is a structured instrument used to diagnose PG. PG and control probands were required to be ≥ 18 years and to speak English. They could not have a psychotic, cognitive, or a chronic neurological disorder (e.g., Parkinson's disease). Control probands were required to have a SOGS score ≤ 2 and a NODS score of 0. Written informed consent was obtained from all probands according to procedures approved by University of Iowa Institutional Review Board.

2.2. Procedures

Probands were interviewed in person. Permission was obtained to interview their first-degree relatives ≥ 18 years who were systematically contacted and invited to participate by telephone blind to case vs. control status. Informant interviews were conducted for those who were deceased, chose not to participate, could not be located, or where the proband refused to allow contact. Informants included their first-degree relatives who consented to an interview. For example, all interviewed relatives were systematically asked about all of their relatives, so we generally had information from multiple individuals about the person who was deceased or otherwise did not participate. All of this information was relevant to the best estimate diagnostic process.

Diagnostic assessments relevant to this analysis included the Structured Clinical Interview for DSM-IV (Spitzer et al., 1994) and the Structured Interview for DSM-IV Personality (Pfohl et al., 1997). The Family History Research Diagnostic Criteria adapted to include criteria for PG (Andreasen et al., 1977, 1986) was used to collect information from collateral informants. The Minnesota Impulsive Disorders interview (Christenson et al., 1994; Grant et al., 2005) used to collect data on intermittent explosive disorder, compulsive buying disorder, kleptomania, compulsive sexual behavior, pyromania, and trichotillomania. We added a module to diagnose Internet addiction. The definition emphasized preoccupation with Internet use, excessive time spent, and subjective distress or impairment of social or occupational functioning. Social and demographic data were collected from all subjects. The methods are further described elsewhere (Black et al., 2014).

A blind consensus procedure was used to make diagnostic assignments for each study subject (Leckman et al., 1982). Raw materials were reviewed independently by two senior diagnosticians. This included a brief narrative summary prepared by the interviewer. If criteria required for the disorder were met, then a definite

diagnosis was assigned. If any necessary criterion was absent, the diagnosis was considered “probable.” If it seemed likely that the subject had the diagnosis, but the diagnosticians could not be certain of a given criterion, then the diagnosis was considered “possible.” If the diagnosticians could not be sure of the presence or absence of a given diagnosis, then that diagnosis was recorded as unknown. Each subject was rated for phenotypes of interest in this study: PG, subclinical PG, recreational gambling, and no gambling. Only definite and probable cases of PG and subclinical PG were included in the analyses.

2.3. Statistical analysis

The lifetime prevalence of spectrum conditions in PG probands and controls was compared using the Chi-square test (or Fisher's exact test) as necessary. The same tests were used to compare conditions in case and control first-degree relatives. We examined the familial relationship between PG and presence of any potential spectrum condition using a method described by Bienvenu et al. (2000). First, we established whether spectrum conditions occurred more frequently among the first-degree relatives of PG probands, indicating a common familial etiology. To control for the potential that spectrum conditions are transmitted independently of PG, the proband's diagnosis of any spectrum condition was included in the logistic regression model. Finally, the presence of PG in relatives was included in the model to determine whether the co-occurring spectrum condition is transmitted independent of PG. Generalized estimating equations (GEE models) were used to account for within-family correlation. Three GEE models were run sequentially with the following predictors: 1) proband years of education, interview type (in person versus telephone), and proband PG status (the base model); 2) the base model and the proband's diagnosis for any spectrum condition; and 3) the base model, the proband's diagnosis for any spectrum condition, and the relative's PG status (diagnosis of definite/probable PG). Each model provided an odds ratio and 95% confidence interval for each predictor variable, including a comparison of PG relatives to control relatives. The proband's years of education and interview type were used as covariates in the models. Statistical tests were 2-tailed with $\alpha=0.05$.

3. Results

The total sample included 1261 individuals: 186 probands (95 PG, 91 controls), 318 directly interviewed FDRs (148 PG, 170 controls), and 757 indirectly assessed relatives (389 PG, 368 controls). Of PG relatives directly interviewed, 38 were interviewed in-person, while 110 were interviewed by telephone. Of control relatives directly interviewed, 25 were interviewed in person and 148 by telephone. The difference was statistically significant ($\chi^2=6.37$, d.f. = 1, $P=0.012$).

The PG and control probands were well-matched for age (mean of 45.6 and 49.4 for PG probands and controls, respectively) and sex (58% and 63% female for PG probands and controls, respectively). Statistically significant differences were observed with education (mean of 14.1 years for PG probands and 15.2 years for controls) and race/ethnicity because 15% of PG probands and 5% of controls were non-white; 8 PG probands were African-American, and 2 were American Indian, while among controls 4 were African-American and 1 was an American Indian. For that reason, these variables were used as covariates in the statistical analysis.

The lifetime prevalence of potential spectrum conditions in PG probands and controls is shown in Table 1. Compulsive buying disorder and having “any spectrum disorder” occurred significantly more frequently in PG probands than controls. Compulsive sexual behavior occurred in 5 of 95 PG probands and none of 91 controls, but the difference did not reach statistical significance. Other spectrum conditions, including intermittent explosive disorder, Internet addiction, kleptomania, and trichotillomania occurred infrequently in PG probands and controls. There were no cases of pyromania.

PG and control relatives were well-matched on sex (PG relatives, 50% female; control relatives, 49% female), mean age (PG relatives, 49.4 years; control relatives, 48.0 years), race/ethnicity, and relationship to proband (i.e., offspring, sibling, and parent) (Black et al., 2014). The groups differed with respect to interview type (in-person vs. telephone), with more control relatives interviewed by telephone (86% of control relatives vs. 74% of PG relatives). Control relatives had more mean years of education (14.6 vs. 13.6 years) than PG relatives.

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