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Should pathological gambling and obesity be considered addictive disorders? A factor analytic study in a nationally representative sample

Carlos Blanco[a,*], María García-Anaya[a,b], Melanie Wall[a,c], José Carlos Pérez de los Cobos[d], Ewelina Swierad[a], Shuai Wang[a], Nancy M. Petry[e]

[a] Department of Psychiatry, New York State Psychiatric Institute, Columbia University, New York, NY 10032, USA
[b] Clinical Research Division, National Institute of Psychiatry Ramón de la Fuente, Mexico City, Mexico
[c] Department of Biostatistics, New York State Psychiatric Institute, Columbia University, New York, NY, USA
[d] Addictive Behaviors Unit, Department of Psychiatry, Hospital de la Santa Creu i Sant Pau, Biomedical Research Institute Sant Pau, (IIB Sant Pau) Departament de Psiguiatria i Medicina Legal, Universitat Autonoma de Barcelona, Barcelona, Spain
[e] Calhoun Cardiology Center, University of Connecticut Health Center, Farmington, CT, USA

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ABSTRACT

Objective: Pathological gambling (PG) is now aligned with substance use disorders in the DSM-5 as the first officially recognized behavioral addiction. There is growing interest in examining obesity as an addictive disorder as well. The goal of this study was to investigate whether epidemiological data provide support for the consideration of PG and obesity as addictive disorders.
Method: Factor analysis of data from a large, nationally representative sample of US adults ($N = 43{,}093$), using nicotine dependence, alcohol dependence, drug dependence, PG and obesity as indicators. It was hypothesized that nicotine dependence, alcohol dependence and drug use dependence would load on a single factor. It was further hypothesized that if PG and obesity were addictive disorders, they would load on the same factor as substance use disorders, whereas failure to load on the addictive factor would not support their conceptualization as addictive disorders.
Results: A model with one factor including nicotine dependence, alcohol dependence, drug dependence and PG, but not obesity, provided a very good fit to the data, as indicated by CFI = 0.99, TLI = 0.99 and RMSEA = 0.01 and loadings of all indicators >0.4.
Conclusion: Data from this study support the inclusion of PG in a latent factor with substance use disorders but do not lend support to the consideration of obesity, as defined by BMI, as an addictive disorder. Future research should investigate whether certain subtypes of obesity are best conceptualized as addictive disorders and the shared biological and environmental factors that account for the common and specific features of addictive disorders.

1. Introduction

Inclusion of pathological gambling (renamed as gambling disorder) in the substance-related and addictive disorders chapter of the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) has brought to the fore considerations of which disorders or behaviors are best conceptualized as addictive disorders. This debate is important because the nosological status of a disorder is an important determinant of its lines of research (Blanco et al., 2009; Moreyra et al., 2002), treatment models (Greene et al., 2011; Petry et al., 2006) and approaches to policy and funding for treatment and research (Petry and Blanco, 2013).

Among the potential candidates that were considered to join the substance related and addictive disorders category in DSM-5, few garnered more attention than pathological gambling (PG) and obesity, possibly due to their devastating impact and recent increases in prevalence (Swinburn et al., 2011; Ziauddeen et al., 2012). Clinical experience and research evidence have suggested that PG shares many features with substance use disorders. These include high levels of comorbidity in clinical (Black and Moyer, 1998; Ibanez et al., 2001) and epidemiological samples (Kessler et al., 2008; Petry et al., 2005), shared genetic variance (Blanco et al., 2012; Slutske et al., 2000), high levels of impulsivity (Blanco et al., 1996, 2009; Petry, 2001), performance in biobehavioral studies (Leeman and Potenza,

* Corresponding author. Tel.: +1 646 774 8111; fax: +1 646 774 8105.
E-mail address: cb255@columbia.edu (C. Blanco).

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2012) and brain imaging studies (Leeman and Potenza, 2012; van Holst et al., 2010). Furthermore, both pharmacological (Grant et al., 2006; Kim et al., 2001) and psychotherapy treatments for PG have been often based on its conceptualization as an addictive disorder (Hodgins et al., 2001; Petry et al., 2006).

Data supporting the consideration of obesity as an addictive disorder have been more mixed. Some empirical studies and reviews have supported the conceptualization of obesity as an addiction based on data suggesting overlapping molecular and cellular mechanisms and reward brain circuits as well as shared genetic vulnerabilities (Galanti et al., 2007; Grucza et al., 2010; Kenny, 2011a,b; Lilenfeld et al., 2008; Volkow et al., 2011; Weller et al., 2008), but other studies have provided countervailing evidence (Fernandez-Castillo et al., 2010; Haltia et al., 2007; Munafo et al., 2009; Smith et al., 2008; Ziauddeen et al., 2012).

We sought to contribute to those lines of research by conducting a factor analysis using data from the National Epidemiologic Survey on Alcohol and Related Conditions, a large, nationally representative sample of US adults. We hypothesized that substance use disorders, i.e., nicotine dependence, alcohol dependence and drug use dependence, would load on a single factor, consistent with prior analyses (Kessler et al., 2011; Krueger et al., 1998). Furthermore, we hypothesized that if PG and obesity were addictive disorders, they would load on the same factor as substance use disorders. By contrast, failure to load on the addictive factor would not support their conceptualization as addictive disorders, at least not as defined within this dataset.

2. Methods and materials

2.1. NESARC sample

The 2001–2002 NESARC is a survey of a representative sample of the United States sponsored by the NIAAA (Grant et al., 2003b; Grant and Kim, 2002). The target population was individuals age 18 years and older in the civilian non-institutional population residing in households and group quarters. The survey included those residing in the continental United States, District of Columbia, Alaska and Hawaii. Face-to-face personal interviews were conducted with 43,093 respondents. The survey response rate was 81%. Blacks, Hispanics, and young adults (ages 18 to 24) were oversampled. The research protocol, including informed consent procedures, received full human subjects review and approval from the U.S. Census Bureau and the U.S. Office of Management and Budget.

Data were weighted to reflect the design characteristics of the NESARC survey and to account for oversampling. Adjustment for non-response across numerous variables, including age, race/ethnicity, sex, region and place of residence, was performed at the household and person level. Weighted data were then adjusted to be representative of the civilian population of the United States on a variety of socioeconomic variables including region, age, race/ethnicity and sex based on the 2000 Decennial Census.

2.2. DSM-IV assessment of SUD, PG and obesity

All diagnoses in this study refer to 12-month diagnoses at the time of the interview. The diagnostic interview was the NIAAA Alcohol Use Disorder and Associated Disabilities Interview Schedule-DSM-IV Version (AUDADIS-IV), a state-of-the-art structured diagnostic interview designed for use by experienced lay interviewers (Grant and Hasin, 2001). As described in detail elsewhere, the AUDADIS-IV included an extensive list of symptom questions that operationalized DSM-IV criteria for nicotine dependence, alcohol dependence and drug-specific dependence for ten classes of drugs: sedatives, tranquilizers, opiates (other than heroin or methadone), stimulants, hallucinogens, cannabis, cocaine, inhalants/solvents, heroin, and other drugs (Grant et al., 2003a, 2004a,b,c). As in previous reports (Compton et al., 2007), dependence on any one or more of the other drugs outlined were aggregated into a single category of drug dependence to increase statistical power and ensure the stability of the estimates.

To assess the presence of PG, all respondents who had gambled 5 or more times in at least one year of their lives were asked about the symptoms of DSM-IV PG. Specifically, the gatekeeping question asked, “Now I’d like to ask you a few questions about gambling. By gambling I mean playing cards for money, betting on horses or dogs or sports games, playing the stock or commodities market, buying lottery tickets or playing bingo or Keno or gambling at a casino, including playing the slot machines. Have you ever gambled at least 5 times in any one year of your life?” Those who responded affirmatively were asked the DSM-IV pathological gambling questions. Consistent with DSM-IV, lifetime AUDADIS-IV diagnoses of PG required the respondent to meet at least five of the 10 DSM-IV criteria. Fifteen symptom items operationalized the 10 Pg criteria with high test–retest reliability, validity and internal consistency (Petry et al., 2005). Furthermore, because substantial evidence from clinical (Strong et al., 2004), genetic (Blanco et al., 2012; Slutske et al., 2000) and epidemiological (Strong and Kahler, 2007) studies suggest that PG forms a continuum, for the purpose of sensitivity analyses, we defined a broader category of disordered gambling (DG). Consistent with prior research we defined DG as requiring at least three criteria be met (Shaffer et al., 1999). We also examined whether the results held when using in the analyses gambling disorder, as defined by DSM-5, i.e., meeting four out of nine criteria (with the “illegal acts criteria” no longer being included among the diagnostic criteria).

We used the body mass index (BMI) to measure obesity as recently recommended (Mooney et al., 2012). Consistent with the National Institutes of Health (NIH), BMI-based definition for obesity (National Institutes of Health, 2004), we defined obesity as a BMI $\geq$ 30. Heights and weights were self-reported.

Test–retest reliability (Canino et al., 1999; Chatterji et al., 1997; Grant et al., 1995), internal consistency and validity (Chatterji et al., 1997; Grant et al., 2004a,b,c; Hasin et al., 2003) of the AUDADIS-IV measures are well documented in psychometric studies conducted in clinical and general population samples. In addition, reliability and validity of AUDADIS substance use disorders were found to be good to excellent in several countries participating in the National Institutes of Health/World Health Organization Reliability and Validity Study (Chatterji et al., 1997; Cottler et al., 1997; Pull et al., 1997; Ustun et al., 1997).

2.3. Statistical analysis

We conducted two sets of analyses. First, raw odds ratio (ORs) as well as ORs adjusted for age and gender (AORs) and their 95% confidence intervals (95% CIs) were used to estimate the bivariate association between pairs of disorders. In accord with longstanding conventions (Agresti, 2002), we consider as significant those ORs whose 95% CIs do not cross 1.

Second, factor analysis was used to test the latent structure of the disorders considered jointly. Factor analyses were selected over other approaches such as latent class analyses or hybrid models (e.g., factor mixture modeling) because prior work has consistently shown that the latent structure of substance use disorders is best represented as a continuum (Markon and Krueger, 2005). To test whether nicotine dependence, alcohol dependence, drug dependence, PG and obesity loaded in the same factor, we conducted a series of confirmatory factor analyses (CFA), using the disorders as binary indicators. First, to confirm we fitted a one-factor model for