



Impulse-control disorders in children and adolescents with obsessive-compulsive disorder

Jon E. Grant*, Maria C. Mancebo, Jane L. Eisen, Steven A. Rasmussen

Butler Hospital and the Department of Psychiatry and Human Behavior, Brown Medical School, Providence, RI 02906, United States

ARTICLE INFO

Article history:

Received 18 December 2008

Received in revised form 26 March 2009

Accepted 15 April 2009

Keywords:

Impulse-control disorders
Adolescence
Co-morbidity
Dual diagnosis
Obsessive-compulsive disorder

ABSTRACT

The aim of this study was to examine current prevalences, clinical correlates and patterns of co-occurrence of impulse-control disorders (ICDs) in children and adolescents with obsessive-compulsive disorder (OCD). We examined rates and clinical correlates of comorbid ICDs in 70 consecutive child and adolescent subjects with lifetime DSM-IV OCD (32.9% females; mean age = 13.8 ± 2.9 years). Comorbidity data were obtained with structured clinical interviews using DSM-IV criteria. OCD severity was assessed with the Child Yale-Brown Obsessive-Compulsive Scale. All variables were compared in OCD subjects with and without current ICDs. 12 (17.1%) subjects met criteria for a current ICD. Pathological skin picking and compulsive nail biting were the most common ICDs with current rates of 12.8% and 10.0%, respectively. OCD subjects with current ICDs were significantly more likely to have a co-occurring tic disorder (66.7% vs. 20.7%). Although having an ICD was associated with greater numerical scores of OCD symptomatology, these differences were not statistically significant. There were no sex-specific patterns of ICD occurrence in children and adolescents with OCD. Certain ICDs are common among children and adolescents with OCD. Better identification of ICDs in children and adolescents with OCD is needed, as are empirically validated treatments for youth with co-occurring ICDs.

© 2009 Elsevier Ireland Ltd. All rights reserved.

1. Introduction

Impulse-control disorders (ICDs) include pathological skin picking, trichotillomania, pathological gambling, and pyromania, among others, and have been grouped together based on perceived similarities in clinical presentation and hypothesized similarities in pathophysiology. The ICDs share common core qualities: 1) repetitive or compulsive engagement in a behavior despite adverse consequences; 2) diminished control over the problematic behavior; 3) an appetitive urge or craving state prior to engagement in the problematic behavior; and 4) a hedonic quality during the performance of the problematic behavior (Kuzma and Black, 2005).

Although they are grouped together, there exists some controversy regarding the most precise categorization of the ICDs. Do the ICDs reflect a separate diagnostic category based on a unique pathophysiology, or are they more accurately seen as a subtype of obsessive-compulsive disorder (OCD)? One related question is also whether all of the ICDs belong in the same category? The irresistible and uncontrollable behaviors characteristic of ICDs suggest a possible similarity to the frequently excessive, unnecessary and unwanted rituals of OCD (Blanco et al., 2001). There are, however, clear differences between ICDs and OCD. For example, unlike people with

OCD, people with ICDs may report an urge or craving state prior to engaging in the problematic behavior and a hedonic quality during the performance of the behavior (Grant and Potenza, 2004). Whereas individuals with ICDs score high on measures of risk-taking and sensation-seeking (Moreyra et al., 2004), individuals with OCD are generally harm avoidant with a compulsive risk-averse endpoint to their behaviors (Kim and Grant, 2001).

As most large-scale studies to date of psychiatric disorders have excluded measures for ICDs, the precise prevalence of most ICDs is currently unclear. Arguably the best data on the prevalence of ICDs exist for pathological gambling. A meta-analysis of 120 published studies and a national prevalence study estimate that the lifetime prevalence of pathological gambling among adults ranges from 0.4% to 1.6% (Shaffer et al., 1999; Petry et al., 2005). Basic epidemiological data on other ICDs are currently lacking.

Studies of ICD prevalence among adults with OCD have reported rates ranging from 16.4% to 35.5% (Fontenelle et al., 2005; Matsunaga et al., 2005; Grant et al., 2006). ICDs in adults with OCD have been associated with significantly worse OCD symptoms and poorer functioning and quality of life (Grant et al., 2006). Both ICDs and OCD generally begin during adolescence, and early onset of ICDs and OCD are associated with poor health and functioning measures during adolescence and later in life (Wilber and Potenza, 2006). No studies, however, have examined the co-occurrence of these disorders in this age group.

Among children and adolescents, ICDs frequently co-occur with other psychiatric disorders, particularly mood and drug use disorders

* Corresponding author. University of Minnesota, 2450 Riverside Avenue, Minneapolis, MN 55454, United States. Tel.: +1 612 273 9736; fax: +1 612 273 9779.

E-mail address: grant045@umn.edu (J.E. Grant).

(Grant et al., 2007). Existing data also indicate that co-occurring ICDs in adolescents are associated with more severe psychiatric symptomatology in non-ICD domains (Grant et al., 2007). For example, co-occurring ICDs have been associated with more frequent hospitalizations for psychiatric stabilization (Grant et al., 2007). Untreated symptoms of ICDs have also been associated with poorer treatment outcomes in non-ICD mental health and substance use domains among patients with co-occurring disorders (Potenza, 2007). As such, it is important for psychiatrists and other mental health practitioners to identify and treat co-occurring ICDs among adolescents. While data suggest co-occurrence of psychiatric disorders with specific ICD behaviors (e.g., gambling) among youths (Kessler et al., 2005; Wilber and Potenza, 2006), the patterns of psychiatric disorder co-occurrence with a broad range of formal ICDs have not been systematically examined in adolescent populations, particularly those with OCD.

Here we examined the current prevalences of co-occurring ICDs in children and adolescents with primary OCD. Based on data in adults, we hypothesized that 1) ICDs would be common in children and adolescents with OCD; 2) ICD co-occurrence would be associated with higher rates of psychiatric hospitalization and poorer social functioning; and 3) ICDs would co-occur with greater rates of co-occurring psychiatric diagnoses.

2. Methods

2.1. Subjects

Children and adolescents who met lifetime DSM-IV criteria for OCD agreed to participate in an ongoing prospective study of the course of OCD. This was a cross-sectional study with a clinical sample of children and adolescents from specialized services and hospitals. Study inclusion criteria were: 1) primary diagnosis of DSM-IV OCD lifetime; 2) ages 6 to 18; 3) treatment-seeking; and 4) the subject and parent (or legal guardian) were willing and able to sign written consent/assent. Exclusion criteria included the presence of an organic mental disorder or mental retardation. The investigation was carried out in accordance with the latest version of the Declaration of Helsinki. The Institutional Review Boards of Brown University and Butler Hospital approved the study and the consent/assent statements. All study participants' parents or guardians provided voluntary written informed consent with the adolescent providing informed assent. Subjects were recruited from several clinical settings located in Rhode Island and Southeastern Massachusetts, including consecutive admissions to an outpatient OCD specialty clinic, inpatient admissions to a private psychiatric hospital and several large outpatient sites that were identified as the main treatment sites for individuals with anxiety disorders.

2.2. Assessments

Participants were interviewed by trained research assistants and completed a semi-structured clinical interview, rater-administered assessments, and self-report questionnaires. Narrative summaries of psychiatric symptoms were prepared for all participants, and DSM-IV diagnoses were assigned. Interview data were rigorously edited and reviewed by senior staff members for clinical and clerical accuracy.

Structured diagnostic interviews, conducted by a Ph.D. level interviewer with expertise in child/adolescent assessments, were used to obtain Axis I diagnoses. The Schedule for Affective Disorders and Schizophrenia for School-Age (K-SADS-PL; Kaufman et al., 1997) for children ages 6–12 and the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-P; First et al., 1995) was used to assess adolescents ages 13–18. All other assessments were conducted by interviewers who had at least a bachelor's degree and completed a rigorous training protocol including didactic seminars (on DSM-IV diagnoses and each of the study instruments), viewing and rating sample tapes, rating several live mock participants, observing and coding actual interviews conducted by a senior rater. More detailed information regarding interviewer training and interrater reliability procedures can be found elsewhere (Pinto et al., 2006; Mancebo et al., 2009).

ICDs are characterized by an impaired ability to resist impulses to engage in ultimately self-destructive behaviors (or ones with deleterious long-term consequences) (Grant and Potenza, 2004). There has been no agreement, however, on which disorders should be grouped in this category. Because several ICDs have been hypothesized to have similarities to OCD (Hollander, 1993), we chose to examine a broad range of ICDs to better understand which disorders may have some commonality with OCD. Toward that end, we examined both behaviors characterized by reward-seeking and impulse dysregulation (pathological gambling, pyromania, kleptomania, and binge eating) and behaviors characterized largely as compulsive habit disorders (trichotillomania, skin picking, and nail biting).

Detailed information on demographic characteristics, clinical features, and treatments received were ascertained using the Butler Hospital OCD Database, a

semi-structured rater administered questionnaire. This instrument has been used in previous phenomenological studies (Rasmussen and Eisen, 1992). Current medications were verified using chart records or consultation with treatment providers.

OCD symptom severity was assessed by the Children's Yale-Brown Obsessive Compulsive Scale (CY-BOCS) (Scahill et al., 1997). The CY-BOCS is a reliable and valid, clinician-administered 10-item scale that assesses severity of obsessions and compulsions. Higher scores on the CY-BOCS indicate greater severity, with total scores ranging from 0 to 40 and scores for the obsessions and compulsions subscales each ranging from 0 to 20.

Overall severity of psychopathology and psychosocial functioning of participants was quantified using the Child Version of the Global Assessment of Symptoms (CGAS; Shaffer et al., 1983). The CGAS is a global rating of 0 to 100 with lower scores reflecting greater levels of psychopathology and impairment.

2.3. Data analysis

The percentages of OCD youth with current and lifetime ICDs, and 95% confidence intervals, were determined. Because OCD severity measures were based on current symptoms, and because there was little difference between rates of current and lifetime ICDs, we compared subjects with current ICDs to those without ICDs. Between-group differences (those with current ICDs compared to those without) were tested using the Pearson chi-square and Fisher exact test for categorical variables and independent samples *t*-tests for continuous variables. All missing data were excluded on a pairwise basis for analysis. Because we performed multiple comparisons, we used an adjusted alpha level of $P < 0.01$; we did not adjust the alpha level to reflect all statistical comparisons because this is the first study of this topic and is therefore exploratory; in addition, the Bonferroni correction tends to be overly conservative (Rosner, 1995).

3. Results

Seventy children and adolescents (23 [32.9%] females; mean age = 13.8 ± 2.9 [range 6–18] years) with DSM-IV OCD participated in the study. The majority of subjects were white, non-Hispanic ($n = 64$; 91.4%).

The mean duration of OCD at time of assessment was 4.47 ± 3.0 years (range 6 months to 13 years). 79% ($n = 55$) of the sample currently met full DSM-IV criteria for OCD. The remaining 21% had met full OCD criteria in the past; 18% ($n = 13$) were currently in partial remission, and 3% ($n = 1$) were currently in full remission. At the time of the intake interview, 89% of the sample was participating in outpatient treatment, 7% were inpatient, and 4% were not in treatment.

Most subjects (80%, $n = 56$) were currently receiving psychotropic medications. The most common types of medications were serotonin-reuptake inhibitor (SRI) antidepressants (75%, $n = 53$), neuroleptics (16%, $n = 11$), benzodiazepines (14%, $n = 10$), and psychostimulants (8%, $n = 6$). 44% ($n = 31$) of subjects had received cognitive-behavioral therapy (CBT) during the previous year, and 37% ($n = 26$) of subjects reported receiving more than 12 sessions of CBT lifetime.

Twelve (17.1%) subjects with OCD were diagnosed with at least one current co-occurring ICD, and 5 (7.0%) had two or more current ICDs. Frequencies of individual ICDs are presented (Table 1). Pathological skin picking was the most common ICD ($n = 9$; 12.8%). No subject had pathological gambling, pyromania, or binge eating disorder.

For those 12 subjects who had OCD and an ICD, 25% ($n = 3$) had ICD onset before OCD, 25% ($n = 3$) had onset of ICD simultaneously with OCD; and 50% ($n = 6$) reported OCD onset before ICD symptoms.

The groups with and without ICDs did not differ significantly on sociodemographic variables or OCD symptom severity measures

Table 1

Current and lifetime comorbid impulse control disorders in youth with lifetime OCD ($n = 70$).

Impulse control disorder	Current <i>N</i> (%) [95% CI]	Lifetime <i>N</i> (%) [95% CI]
Pathological skin picking	9 (12.8) [6.5–22.1]	10 (14.3) [7.59–23.86]
Compulsive nail biting	7 (10.0) [4.5–18.6]	7 (10.0) [4.59–18.63]
Trichotillomania	1 (1.4) [0.15–6.4]	3 (4.3) [1.22–11.00]
Binge eating disorder	0 (0.0)	0 (0.0)
Pathological gambling	0 (0.0)	0 (0.0)
Kleptomania	1 (1.4) [0.15–6.4]	1 (1.4) [0.15–6.48]
Pyromania	0 (0.0)	0 (0.0)
Any impulse control disorder	12 (17.1) [9.7–27.2]	15 (21.4) [13.09–32.07]

Table 2
Demographics and clinical characteristics of OCD subjects with and without a current impulse control disorder (ICD).

	OCD only (n = 58)	OCD with ICD (n = 12)	Statistic	df	P-value
Age					
Mean (± S.D.), [range], years	14.10 (2.9) [6–18]	12.83 (2.7) [9–17]	1.37 ^a	68	0.174
Gender, n (%)					
Female,	40 (69.0)	7 (58.3)	*	*	0.511
Ethnicity, n (%)					
Caucasian, non-Hispanic	54 (93.1)	10 (83.3)	*	*	0.272
Education					
Mean (± S.D.), [range], years	8.48 (3.0) [0–12]	7.50 (3.1) [3–12]	1.01	68	0.313
Age of OCD diagnosis onset					
Mean (± S.D.), years	9.83 (3.6)	7.58 (3.2)	1.97	68	0.05
Treatments received (Current), n (%)					
Serotonin reuptake inhibitor	43 (74.1)	10 (83.3)	*	*	0.717
Cognitive-behavioral therapy	25 (43.1)	6 (50.0)	0.19	1	0.662
History of psychiatric hospitalization					
History of suicide attempt	3 (5.2)	0 (0.0)	*	*	1.000
Comorbid lifetime disorders, n (%)					
Major depressive disorder	21 (36.2)	7 (58.3)	*	*	0.201
Bipolar I or II disorder	1 (1.7)	0 (0.0)	*	*	0.647
Any psychotic disorder	2 (3.4)	0 (0.0)	*	*	1.00
Any anxiety disorder (not OCD)	31 (53.4)	7 (58.3)	0.96	1	0.757
Substance abuse/dependence	0 (0.0)	1 (8.3)	*	*	0.171
Any eating disorder (not binge eating disorder)	1 (1.7)	0 (0.0)	*	*	1.000
Any somatoform disorder	0 (0.0)	2 (16.7)	*	*	0.027
Any tic disorder	12 (20.7)	8 (66.7)	*	*	0.003
Oppositional defiant disorder	7 (12.1)	2 (16.7)	*	*	0.646
Attention deficit hyperactivity disorder	16 (27.6)	4 (33.3)	*	*	0.732
Any comorbid disorder (not OCD or Impulse Disorder)	47 (81.0)	12 (100.0)	2.70	1	0.100
Any externalizing disorder ¹	16 (27.6)	5 (41.7)	0.93	1	0.333
Any internalizing disorder ²	41 (70.7)	9 (75.0)	*	*	1.000
Type of OCD obsessions					
Aggression	22 (37.93)	6 (50.0)	0.60	1	0.437
Overresponsibility for harm	32 (55.2)	7 (58.3)	0.40	1	0.841
Contamination	37 (63.8)	7 (58.3)	1.18	1	0.722
Sexual	12 (20.7)	2 (16.7)	*	*	1.000
Hoarding	17 (29.3)	6 (50.0)	1.92	1	0.165
Religious	13 (22.4)	4 (33.3)	*	*	0.467
Magical thinking	9 (15.5)	4 (33.3)	*	*	0.216
Somatic	12 (20.7)	3 (25.0)	*	*	0.711
Miscellaneous	10 (17.2)	3 (25.0)	*	*	0.683
Type of OCD Compulsions					
Cleaning/washing	28 (48.3)	6 (50.0)	0.12	1	0.913
Checking	34 (58.6)	10 (83.3)	2.60	1	0.107
Repeating rituals	33 (56.9)	9 (75.0)	1.35	1	0.244
Counting	7 (12.1)	2 (16.7)	*	*	0.646
Ordering/arranging	33 (56.9)	8 (66.7)	0.39	1	0.532
Hoarding/collecting	14 (24.1)	4 (33.3)	*	*	0.490
Games	9 (15.5)	1 (8.3)	*	*	1.000
Rituals involving people	32 (55.2)	2 (16.7)	5.90	1	0.015
Miscellaneous	45 (77.6)	12 (100.0)	3.30	1	0.069
CYBOCS total score, Mean (± S.D.) [range]	20.55 (± 8.7) [0–38]	23.16 (± 6.0) [15–38]	– 1.25	22.0	0.223
CYBOCS obsession score, Mean (± S.D.) [range]	10.13 (± 4.5) [0–19]	11.00 (± 3.2) [7–19]	– 0.78	21.3	0.444
CYBOCS compulsion score, Mean (± S.D.) [range]	10.41 (± 4.4) [0–19]	12.16 (± 3.0) [8–19]	– 1.67	22.5	0.109
CGAS, Mean ± S.D., [range]	56.00 (± 14.8) [31–89]	48.17 (± 10.9) [30–70]	1.72	68	0.088

^at-test.

*Statistic: Chi-square or Fisher's Exact test.

¹Externalizing disorders include substance use disorders, oppositional defiant disorder, conduct disorder, and attention deficit hyperactivity disorder.

²Internalizing disorders include any depressive and anxiety disorders.

(Table 2). Although having an ICD was associated with greater numerical scores of OCD symptomatology, these differences were not statistically significant (Table 2). No sex differences were observed between groups, and a similar proportion of girls as compared with boys had an ICD.

Individuals with ICDs were more likely to be diagnosed with a tic disorder (66.7% compared to 20.7%; Fisher's exact = .003). Individuals with OCD and an ICD had a significantly greater number of co-occurring disorders (5.1 co-occurring disorders compared to 1.9 for those with OCD and no ICD; $t = 5.8$; $df = 68$; $P < 0.001$).

4. Discussion

In this study, we determined the rates of current ICDs in 70 children and adolescents with lifetime DSM-IV OCD. To our knowledge, this is the largest and broadest sample of youth with primary OCD that has been studied and may increase the generalizability of the results. Only 17.1% of OCD subjects in this study had a current ICD, and the majority of subjects diagnosed with an ICD reported symptoms of either skin picking or nail biting.

The rates of ICDs found in this study are similar to the rates found in previous samples of adult OCD subjects (16.4% to 35.5%) (Fontenelle et al., 2005; Matsunaga et al., 2005; Grant et al., 2006). Also like other studies in adults with OCD, the grooming disorders were well represented in youth with OCD. Although epidemiological studies of grooming disorders have not been performed, the rate of current skin picking (12.8%) was higher than reported in other populations (2% in dermatological patients [Griesemer, 1978; Gupta et al., 1987] to 2.7%–3.8% in college students) (Arnold et al., 2001; Keuthen et al., 2000). Nail biting was the second most common ICD found in this study (current rate of 10.0%), and this rate was also higher than the 6.4% current prevalence rate found in one study of college students (Teng et al., 2002). Similarly, the rate of trichotillomania in this study (1.4% current) was similar to those found in the general population (1.0%–2.5%) (Christenson et al., 1991; Rothbaum et al., 1993). Therefore, this study suggests that the grooming disorders may be more common in youth with OCD than in the general population. One possible explanation for the fact that grooming disorders were common could be that these behaviors tend to reduce anxiety, much as compulsions do. Conversely, kleptomania, pyromania, and pathological gambling are more typically described as reward-driven or pleasurable. This elevated rate of co-occurrence of grooming disorder may support some shared underlying neurobiological correlates and genetic factors in at least some individuals with these ICDs (Bienvenu et al., 2000). One previous study found significantly higher rates of these grooming disorders in first-degree relatives of OCD probands thereby demonstrating a possible familial transmission (Bienvenu et al., 2000).

Of note was the fact that other ICDs appear to be quite rare in children and adolescents with OCD. Although epidemiological studies of most ICDs are lacking, recent studies estimate that the prevalence of problem gambling among adolescents ranges from 1% to 9% (Jacobs, 2004). The current rate of pathological gambling in this sample of youth with OCD (0%) is therefore notably lower than found in the general population. In addition, the findings from this study of the current rates of kleptomania (1.4% compared to 8.8%) and pyromania (0% compared to 6.9%) were lower than rates found in a population of adolescent psychiatric inpatients (Grant et al., 2007). These findings support previous studies that have found the co-occurrence of pathological gambling, kleptomania, or pyromania in samples of OCD subjects to be uncommon (Fontenelle et al., 2005; Grant et al., 2006). These findings may suggest that the concept of the obsessive compulsive spectrum is too broad and that only certain ICDs should be included.

OCD youth with a current ICD were more likely to have a co-occurring tic disorder. OCD with tic disorders may occur earlier in life than OCD without tics (Rosario-Campos et al., 2001; Jaisooriya et al., 2008). Because age of onset of OCD diagnosis was not significantly

different between groups, age as a confounding variable seems less likely and the association of ICDs and tic disorders appears reinforced and independent of age. This finding is also consistent with a recent multi-level latent class analysis that found that OCD subjects with comorbid tic disorders were more likely to have grooming disorders (Nestadt et al., 2009). Is there a common biology underlying both the grooming ICDs and tic disorders? Studies suggest that dopamine dysregulation may underlie tic disorders (Leckman et al., 2007) and a similar hypothesis may explain grooming disorders (Hemmings et al., 2006). Further studies are needed to examine to what extent tics and grooming ICDs share common neurobiology. These findings may also begin to explain why dopamine antagonists have shown some efficacy in the treatment of both tic disorders and grooming ICDs (Onofrij et al., 2000; Arnold et al., 2001; Dion et al., 2002; Stewart and Nejtjek, 2003; Scahill et al., 2003).

Our hypothesis that ICD presence would be positively associated with greater functional impairment or greater rates of psychiatric hospitalization was not supported by these data. These results seemingly contrast with findings in OCD adults in whom ICD co-occurrence was associated with more frequent psychiatric hospitalizations and functional difficulties (Grant et al., 2006). The differences between adults and youth with OCD and ICDs may suggest that if left untreated, ICD presence in OCD may progress to a more severe form of OCD. Clinicians should carefully screen OCD patients for skin picking and nail biting, as the presence of these disorders may have treatment implications. Further research is needed to explore how the relationship between OCD and ICDs may affect treatment outcome. In addition, research is needed to clarify the extent to which each disorder may contribute to the other disorder's development and maintenance.

This study has several limitations. Most notably, we based ICD diagnoses on subject report only and did not obtain information from parents. Because the behaviors associated with ICDs are often denied due to shame, the rates found in this study may underestimate the actual rates of ICDs in subjects with OCD. Also, we did not evaluate subjects for certain ICDs (e.g., compulsive internet use, compulsive videogame playing, compulsive buying) that might be more common in this age group. If we had, the rates of ICDs may have been arguably higher. Furthermore, this study is cross-sectional and not prospective. Therefore, a clear understanding of how the ICD and OCD are related is beyond the scope of this analysis. In addition, it is unclear how generalizable our results are to youth with OCD in the community. Because the subjects in this study were recruited from specialized services, they probably represent more severe cases compared to non-specialized services and the community. Also, although this study recruited from multiple treatment sites, only youth with primary OCD were enrolled in the study. Therefore, those individuals with a primary ICD and secondary OCD were not included, and this may have resulted in an under-estimation of ICD comorbidity. Nonetheless, our sample may generalize better than previous OCD studies, in that the study inclusion/exclusion criteria were very broad. The study also used both self-report and interviewer-administered measures with strong psychometric properties and established norms. Ideally, having a population-based control as part of this study and assessing the same ICDs with the same criteria, would strengthen these findings.

In conclusion, these results suggest that ICDs are relatively uncommon in youth with OCD. The notable exceptions appear to be skin picking and nail biting. Additional research on this topic is needed, including larger prevalence studies, studies of clinical correlates of ICDs in OCD, and studies that may shed light on the relationship between OCD and ICDs (e.g., studies assessing rates of OCD in ICD samples, prospective studies, and studies of etiology and pathophysiology). OCD is a highly heterogeneous disorder, and therefore future studies examining ICD co-occurrence in larger samples of youth with OCD are needed to determine whether certain OCD symptom dimensions are associated with differential treatment responses.

Acknowledgment

This study was supported by a grant from the National Institute of Mental Health (R01 MH060218) to Dr. Rasmussen.

References

- Arnold, L.M., Auchenbach, M.B., McElroy, S.L., 2001. Psychogenic excoriation. Clinical features, proposed diagnostic criteria, epidemiology and approaches to treatment. *CNS Drugs* 15 (5), 351–359.
- Bienvenu, O.J., Samuels, J.F., Riddle, M.A., Hoehn-Saric, R., Liang, K.Y., Cullen, B.A., Grados, M.A., Nestadt, G., 2000. The relationship of obsessive-compulsive disorder to possible spectrum disorders: results from a family study. *Biological Psychiatry* 48 (4), 287–293.
- Blanco, C., Moreyra, P., Nunes, E.V., Sáiz-Ruiz, J., Ibáñez, A., 2001. Pathological gambling: addiction or compulsion? *Seminars in Clinical Neuropsychiatry* 6 (3), 167–176.
- Christenson, G.A., Pyle, R.L., Mitchell, J.E., 1991. Estimated lifetime prevalence of trichotillomania in college students. *Journal of Clinical Psychiatry* 52 (10), 415–417.
- Dion, Y., Annable, L., Sandor, P., Chouinard, G., 2002. Risperidone in the treatment of tourette syndrome: a double-blind, placebo-controlled trial. *Journal of Clinical Psychopharmacology* 22 (1), 31–39.
- First, M.B., Spitzer, R.L., Gibbon, M., Williams, J.B.W., 1995. Structured Clinical Interview for DSM-IV-Patient Edition (SCID-I/P, Version 2.0). Biometrics Research Department, New York State Psychiatric Institute, New York, NY.
- Fontenelle, L.F., Mendlowicz, M.V., Versiani, M., 2005. Impulse control disorders in patients with obsessive-compulsive disorder. *Psychiatry and Clinical Neurosciences* 59 (1), 30–37.
- Grant, J.E., Potenza, M.N., 2004. Impulse control disorders: clinical characteristics and pharmacological management. *Annals of Clinical Psychiatry* 16 (1), 27–34.
- Grant, J.E., Mancebo, M.C., Pinto, A., Eisen, J.L., Rasmussen, S.A., 2006. Impulse control disorders in adults with obsessive compulsive disorder. *Journal of Psychiatric Research* 40 (6), 494–501.
- Grant, J.E., Williams, K.A., Potenza, M.N., 2007. Impulse-control disorders in adolescent psychiatric inpatients: co-occurring disorders and sex differences. *Journal of Clinical Psychiatry* 68 (10), 1584–1592.
- Griesemer, R.D., 1978. Emotionally triggered disease in a dermatologic practice. *Psychiatric Annals* 8, 407–412.
- Gupta, M.A., Gupta, A.K., Haberman, H.F., 1987. The self-inflicted dermatoses: a critical review. *General Hospital Psychiatry* 9, 45–52.
- Hemmings, S.M., Kinnear, C.J., Lochner, C., Seedat, S., Corfield, V.A., Moolman-Smook, J.C., Stein, D.J., 2006. Genetic correlates in trichotillomania – a case-control association study in the South African Caucasian population. *The Israel Journal of Psychiatry and Related Sciences* 43 (2), 93–101.
- Hollander, E., 1993. *Obsessive-Compulsive Related Disorders*. American Psychiatric Press, Washington, D.C.
- Jacobs, D.F., 2004. Youth gambling in North America: long term trends and future prospects. In: Derevensky, J.L., Gupta, R. (Eds.), *Gambling problems in youth: Theoretical and applied perspectives*. Kluwer, New York, pp. 1–26.
- Jaisooriya, T.S., Reddy, Y.C., Srinath, S., Thennarasu, K., 2008. Obsessive-compulsive disorder with and without tic disorder: a comparative study from India. *CNS Spectrums* 13 (8), 705–711.
- Kaufman, J., Birmaher, B., Brent, D., Rao, U., Flynn, C., Moreci, P., Williamson, D., Ryan, N., 1997. Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version (K-SADS-PL): initial reliability and validity data. *Journal of the American Academy of Child and Adolescent Psychiatry* 36 (7), 980–988.
- Kessler, R.C., Berglund, P., Demler, O., Jin, R., Merikangas, K.R., Walters, E.E., 2005. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry* 62 (6), 593–602.
- Keuthen, N.J., Deckersbach, T., Wilhelm, S., Hale, E., Fraim, C., Baer, L., O'Sullivan, R.L., Jenike, M.A., 2000. Repetitive skin-picking in a student population and comparison with a sample of self-injurious skin-pickers. *Psychosomatics* 41 (3), 210–215.
- Kim, S.W., Grant, J.E., 2001. Personality dimensions in pathological gambling disorder and obsessive-compulsive disorder. *Psychiatry Research* 104 (3), 205–212.
- Kuzma, J.M., Black, D.W., 2005. Disorders characterized by poor impulse control. *Annals of Clinical Psychiatry* 17 (4), 219–226.
- Leckman, J.F., Peterson, B.S., Anderson, G.M., Arnsten, A.F., Pauls, D.L., Cohen, D.J., 2007. Pathogenesis of Tourette's syndrome. *Journal of Child Psychology and Psychiatry, and allied disciplines* 38 (1), 119–142.
- Mancebo, M.C., Grant, J.E., Pinto, A., Eisen, J.L., Rasmussen, S.A., 2009. Substance use disorders in an obsessive compulsive disorder clinical sample. *Journal of Anxiety Disorders* 23 (4), 429–435.
- Matsunaga, H., Kiriike, N., Matsui, T., Oya, K., Okino, K., Stein, D.J., 2005. Impulsive disorders in Japanese adult patients with obsessive-compulsive disorder. *Comprehensive Psychiatry* 46 (1), 43–49.
- Moreyra, P., Ibanez, A., Saiz-Ruiz, J., Blanco, C., 2004. Categorization. In: Grant, J.E., Potenza, M.N. (Eds.), *Pathological Gambling: A Clinical Guide to Treatment*. APPI, Washington, D.C., pp. 55–68.
- Nestadt, G., Di, C.Z., Riddle, M.A., Grados, M.A., Greenberg, B.D., Fyer, A.J., McCracken, J.T., Rauch, S.L., Murphy, D.L., Rasmussen, S.A., Cullen, B., Pinto, A., Knowles, J.A., Piacentini, J., Pauls, D.L., Bienvenu, O.J., Wang, Y., Liang, K.Y., Samuels, J.F., Roche, K.B., 2009. Obsessive-compulsive disorder: subclassification based on co-morbidity. *Psychological Medicine* 39 (9), 1491–1501.
- Onofrij, M., Paci, C., D'Andrea Matteo, G., Toma, L., 2000. Olanzapine in severe Gilles de la Tourette syndrome: a 52-week double-blind cross-over study vs. low-dose pimozide. *Journal of Neurology* 247 (6), 443–446.

- Petry, N.M., Stinson, F.S., Grant, B.F., 2005. Comorbidity of DSM-IV pathological gambling and other psychiatric disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Journal of Clinical Psychiatry* 66, 564–574.
- Pinto, A., Mancebo, M.C., Eisen, J.L., Pagano, M.E., Rasmussen, S.A., 2006. The Brown Longitudinal Obsessive Compulsive Study: clinical features and symptoms of the sample at intake. *Journal of Clinical Psychiatry* 67 (5), 703–711.
- Potenza, M.N., 2007. Impulse control disorders and co-occurring disorders: dual diagnosis considerations. *Journal of Dual Diagnosis* 3 (2), 47–57.
- Rasmussen, S.A., Eisen, J.L., 1992. The epidemiology and clinical features of obsessive compulsive disorder. *The Psychiatric Clinics of North America* 15 (4), 743–758.
- Rosario-Campos, M.C., Leckman, J.F., Mercadante, M.T., Shavitt, R.G., Prado, H.S., Sada, P., Zamignani, D., Miguel, E.C., 2001. Adults with early-onset obsessive-compulsive disorder. *American Journal of Psychiatry* 158 (11), 1899–1903.
- Rosner, B., 1995. *Fundamentals of biostatistics*, 4th ed. Duxbury Press, Belmont, CA.
- Rothbaum, B.O., Shaw, L., Morris, R., Ninan, P.T., 1993. Prevalence of trichotillomania in a college freshman population. *Journal of Clinical Psychiatry* 54 (2), 72–73.
- Scahill, L., Riddle, M.A., McSwiggin-Hardin, M., Ort, S.I., King, R.A., Goodman, W.K., Cicchetti, D., Leckman, J.F., 1997. Children's Yale-Brown Obsessive Compulsive Scale: reliability and validity. *Journal of the American Academy of Child and Adolescent Psychiatry* 36 (6), 844–852.
- Scahill, L., Leckman, J.F., Schultz, R.T., Katsovich, L., Peterson, B.S., 2003. A placebo-controlled trial of risperidone in Tourette syndrome. *Neurology* 60 (7), 1130–1135.
- Shaffer, D., Gould, M.S., Brasic, J., Ambrosini, P., Fisher, P., Bird, H., Aluwahlia, S., 1983. A Children's Global Assessment Scale (CGAS). *Archives of General Psychiatry* 40, 1228–1231.
- Shaffer, H.J., Hall, M.N., Vander Bilt, J., 1999. Estimating the prevalence of disordered gambling behavior in the United States and Canada: a research synthesis. *American Journal of Public Health* 89, 1369–1376.
- Stewart, R.S., Nejtck, V.A., 2003. An open-label, flexible-dose study of olanzapine in the treatment of trichotillomania. *Journal of Clinical Psychiatry* 64 (1), 49–52.
- Teng, E.J., Woods, D.W., Twohig, M.P., Marcks, B.A., 2002. Body-focused repetitive behavior problems. Prevalence in a nonreferred population and differences in perceived somatic activity. *Behavior Modification* 26 (3), 340–360.
- Wilber, M.K., Potenza, M.N., 2006. Adolescent gambling: research and clinical implications. *Psychiatry* 3, 40–48.