Impulse-Control Disorders in Adolescent Psychiatric Inpatients: Co-Occurring Disorders and Sex Differences

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Objective: To examine in a sex-sensitive manner the frequencies, clinical correlates, and patterns of co-occurrence of impulse-control disorders in adolescent psychiatric inpatients.

Method: 102 consecutive adolescents (54.9% females; mean age = 15.8 ± 1.4 years) admitted to an inpatient psychiatric service for a variety of disorders were screened for impulse-control disorders from January through June 2006 using the Minnesota Impulsive Disorders Interview. Subjects screening positive were blindly evaluated with structured clinical interviews.

Results: Forty-one patients (40.2%) met criteria for a current impulse-control disorder. The most common impulse-control disorder was intermittent explosive disorder (12.7%). Compared to patients without impulse-control disorders, those with impulse-control disorders were more likely to report previous psychiatric hospitalization (75.6% vs. 41.0%; p = .001) and internalizing disorders (78.0% vs. 55.7%; p = .04). Although not statistically significantly different, a numerically larger proportion of girls as compared with boys had an impulse-control disorder (48.2% vs. 30.4%; p = .07). In particular, a statistically greater percentage of females had pyromania (12.5% vs. 0%; p = .02).

Conclusions: Impulse-control disorders are common among adolescent psychiatric inpatients, with a trend toward impulse-control disorders being more common in girls. Impulse-control disorders appear associated with more severe psychiatric illness. Sex-specific patterns of impulse-control disorder occurrence in adults do not appear uniformly applicable to adolescent psychiatric inpatients. Better identification of impulse-control disorders in adolescents is needed, as are empirically validated treatments for adolescents with co-occurring impulse-control disorders.

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Compared to other psychiatric disorders, relatively little clinical and research attention has been devoted to impulse-control disorders. Formal impulse-control disorders include pathological gambling, kleptomania, trichotillomania, intermittent explosive disorder, and pyromania and are characterized by difficulties resisting urges to engage in behaviors that are excessive and/or ultimately harmful to oneself or others.[1] Diagnostic criteria have also been proposed for other disorders categorized as impulse-control disorders not otherwise specified (NOS) in the DSM-IV-TR: pathologic skin picking, compulsive computer use, compulsive sexual behavior, and compulsive buying.[2] Among adults, impulse-control disorders are relatively common, carry significant morbidity and mortality, and can be effectively treated with behavioral and pharmacologic therapies.[3] Although onset of specific impulse-control disorder behaviors (e.g., gambling) is common during childhood and adolescence and early onset is associated with poor health and functioning measures during adolescence and later in life,[4] relatively few structured examinations of youths have examined a broad spectrum of impulse-control disorders or their clinical correlates within this age group.

Among adults, impulse-control disorders frequently co-occur with other psychiatric disorders (particularly mood and substance use disorders) in both clinical and community samples.[2,4,5] In one study,[6] 30.9% of adult psychiatric inpatients were found to have an active impulse-control disorder. In contrast, only 1.5% were diagnosed with an impulse-control disorder upon admission.[6] These findings suggest that impulse-control disorders frequently go unrecognized and untreated within adult psychiatric settings. Existing data indicate that co-occurring disorders in adults with impulse-control disorders are associated with more severe medical and mental health problems.[7,8] Impulse-control disorder co-occurrence in adults with substance use disorders has been associated with increased suicidality and hospitalization for detoxification and psychiatric stabilization.[7] Untreated symptoms of impulse-control disorders have been associated with poorer treatment outcomes in non–impulse-control disorder mental health (e.g., anxiety) and substance use (e.g., alcohol use) domains among patients with co-occurring disorders.[7] As such, it is important for psychiatrists and other mental health practitioners to identify and treat co-occurring impulse-control disorders among adults. While data suggest co-occurrence of psychiatric disorders (substance use, anxiety, and personality disorders) with specific impulse-control disorder behaviors (e.g., gambling, aggression) among youths,[9,10] the patterns of psychiatric disorder co-occurrence with a broad range of formal impulse-control disorders have not been systematically examined in adolescent populations, particularly those hospitalized for psychiatric reasons.

Data indicate that common psychiatric disorders aggregate in 2 main groups: internalizing and externalizing disorders (i.e., disorders characterized by either withdrawal from society or being at odds with society, respectively).[11–13] Where impulse-control disorders fit within this structure is not completely understood, particularly as assessments of impulse-control disorders have often been omitted from major psychiatric epidemiologic studies.[14,15] Impulse-control disorders share with externalizing disorders (for example, substance use disorders and antisocial personality disorder) a disinhibited personality style and lack of constraint.[16] Impulse-control disorders also share with internalizing disorders (for example, major depressive disorder and social phobia) an uncomfortable mood or anxiety state that often precedes engagement in the impulse-control disorder behavior, as reflected in the diagnostic criteria for impulse-control disorder.[1] Among adults, impulse-control disorders co-occur with a broad spectrum of internalizing and externalizing disorders,[17] and existing data suggest similarly strong genetic contributions between impulse-control disorders like pathological gambling and internalizing[18] and externalizing[19,20] disorders. An improved understanding of the relationship between impulse-control disorders and internalizing and externalizing disorders among adolescent girls and boys thus not only is clinically significant, but also has theoretical implications for conceptualizing, classifying, and treating these disorders in both adolescents and adults.[21]

Significant sex differences exist in the frequencies of internalizing and externalizing disorders, with girls and women more likely to internalize and experience anxiety and depressive disorders and boys and men more likely to externalize and experience conduct and substance use disorders.[12,22] Although existing data are limited and often derived from treatment samples, certain impulse-control disorders (including those considered impulse-control disorders NOS in the DSM-IV-TR) appear more common in women (e.g., compulsive buying, trichotillomania, compulsive skin picking, and kleptomania) and others more common in men (e.g., pathologic gambling, compulsive sexual behaviors, intermittent explosive disorder, pyromania).[3,17,23] Although data indicate that this pattern extends into youth for specific impulse-control disorders,[4,17] the extent to which adult patterns are applicable to youths for a broad range of formal impulse-control disorders has not been empirically studied, particularly among youth with other psychiatric concerns.

Here we examined the frequencies of co-occurring impulse-control disorders in adolescents who were voluntarily hospitalized in a psychiatric inpatient facility for a variety of psychiatric reasons (for example, depression, substance use, and conduct disorders). On the basis of data in adults, we hypothesized that (1) impulse-control disorders would be common but infrequently diagnosed upon admission; (2) impulse-control disorders would be associated with high rates of rehospitalization and suicidality; (3) impulse-control disorders would co-occur with a broad range of psychiatric diagnoses, including both internalizing and externalizing ones; and (4) impulse-control disorders more common in women would be more frequently observed in girls and those more frequently observed in men would be more frequently observed in boys.

METHOD

One hundred two consecutive patients (56 females [54.9%]; mean age = 15.8 ± 1.4 [range, 13–18] years) presenting for voluntary admission to an adolescent inpatient unit at a public university hospital participated. Inclusionary criteria included ability to read and understand the consent forms. Exclusionary criteria included involuntary admission as a means of avoiding consent under duress. Patients admitted involuntarily who later agreed to voluntary admission, however, were not asked to participate. All disorders were allowed, including behavioral problems secondary to trauma or neurologic disease and substance abuse. Demographic and clinical variables were taken from patients' charts. Diagnosis at

admission was made by a board-certified child and adolescent psychiatrist. The institutional review board approved the study. After complete description of the study, subjects' assent was obtained after their parents provided written informed consent.

Assessments

One investigator (K.A.W.) trained in the phenomenology of impulse-control disorders and use of the Minnesota Impulsive Disorders Interview (MIDI) screened all subjects from January through June 2006 for current (past-year) impulse-control disorders. The MIDI is a semistructured clinical interview with excellent classification accuracy in adults with impulse-control disorders.[6] The MIDI includes probe questions for each impulse-control disorder (including impulse-control disorders NOS except compulsive computer use, which was not assessed), with additional follow-up questions reflecting DSM-IV criteria. Questions for compulsive buying, compulsive sexual behavior, and pathologic skin picking reflect the impulse-control disorder criteria of increasing tension followed by relief, personal distress, and impairment. The investigator performing the screening interview scored the MIDI as described previously.[6]

Subjects screening positive for an impulse-control disorder were evaluated with structured clinical interviews by a psychiatrist (J.E.G.) with expertise in impulse-control disorders who was unaware of the particular impulse-control disorder(s) for which a subject screened positive. This second assessment involved administration of the following instruments: Structured Clinical Interview for Pathologic Gambling and Structured Clinical Interview for Kleptomania, diagnostic instruments previously found to be reliable and valid in adults[24,25]; proposed diagnostic criteria for compulsive buying, compulsive sexual behavior, and pathologic skin picking[26–28]; and diagnostic modules using DSM-IV-TR criteria for intermittent explosive disorder (IED), pyromania, and trichotillomania.[6] Consistent with DSM-IV-TR classifications, diagnoses of pyromania, kleptomania, and IED were not made if the subject met criteria for conduct disorder, and the diagnosis of IED was also not made if the subject met criteria for attention-deficit/hyperactivity disorder (ADHD). Diagnoses of impulse-control disorders were not made if the behavior occurred only during an episode of hypomania or mania.

All subjects' parents or legal guardians underwent a thorough assessment that included recording all prior psychiatric hospitalizations of the subject and reasons for hospitalization. This information was taken from subjects' charts. In addition to the assessment, which documented history of suicide attempts reported by parents or guardians, all subjects underwent a semistructured clinical interview examining history of suicide attempts and current and past suicidal thoughts, intentions, and plans.

The semistructured interview also included assessment of each subject's history of self-injurious behavior to distinguish it from suicide attempts. Self-injurious behavior was not diagnosed as an independent impulse-control disorder. Co-occurring admission diagnoses were grouped into the larger categories of internalizing and externalizing disorders based on previous research.[13] Externalizing disorders (disorders reflecting an individual's being at odds with society) included substance use disorders, oppositional defiant disorder, conduct disorder, and ADHD, whereas internalizing disorders (disorders characterized by withdrawal from society) included depressive and anxiety disorders.[13] Although bipolar disorder has been hypothesized as being both an internalizing and externalizing disorder,[11] research has not examined bipolar disorder using this construct,[13] and therefore it was not included in our assessment of externalizing and internalizing disorders.

Data Analysis

The percentages of patients with current impulse-control disorders (including impulse-control disorders NOS), and 95% confidence intervals, were determined. Between-group differences (those with current impulse-control disorders compared to those without) were tested using the Pearson χ^2 test and 2-sided Fisher exact test for categorical variables and 2-tailed independent-samples t tests for continuous variables.

Classification Accuracy of the MIDI

Classification accuracy of the MIDI among adolescent psychiatric inpatients was assessed as in our prior study of adults.[6] Similar to its performance in assessing impulse-control disorders in adults, the MIDI demonstrated the following classification accuracy for each impulse-control disorders based on the subsequent structured clinical interviews: IED (sensitivity, 100%; specificity, 70.8%), pathologic skin picking (sensitivity, 75.0%; specificity, 91.1%), kleptomania (sensitivity, 100%; specificity, 95.7%), pyromania (sensitivity, 85.7%; specificity, 98.9%), compulsive buying (sensitivity, 83.3%; specificity, 95.1%), compulsive sexual behavior (sensitivity, 100%; specificity, 89.7%), pathologic gambling (sensitivity, 100%; specificity, 97.9%), and trichotillomania (sensitivity, 100%; specificity, 98.0%).

RESULTS

Forty-one patients (40.2%) were diagnosed with at least one current co-occurring impulse-control disorder. Sixteen (15.7%) had 2 or more current impulse-control disorders, and 5 (4.9%) had 3. Only 1 patient (1.0%) was diagnosed with an impulse-control disorder (trichotillomania) upon admission. Frequencies of individual impulse-control disorders are presented in Table 1. IED

Table 1. Current Prevalence of Impulse-Control Disorders Among Adolescent Psychiatric Inpatients (N = 102)

Impulse-Control Disorder	Current Prevalence, N (%)	95% CI, %
Intermittent explosive disorder	13 (12.7)	7.2 to 21.1
Pathologic skin picking	12 (11.8)	6.5 to 20.0
Kleptomania	9 (8.8)	4.4 to 16.5
Pyromania	7 (6.9)	3.0 to 14.1
Compulsive buying	7 (6.9)	3.0 to 14.1
Compulsive sexual behavior	5 (4.9)	1.8 to 11.6
Pathological gambling	5 (4.9)	1.8 to 11.6
Trichotillomania	4 (3.9)	1.3 to 10.3

was the most common impulse-control disorder (12.7%), and trichotillomania was the least common (3.9%). For those subjects with an impulse-control disorder, the most common comorbid disorders were mood (75.6%), drug use (48.8%), and alcohol use (34.1%) disorders.

The groups with and without impulse-control disorders did not differ significantly on sociodemographic measures, although older age and female sex were associated at a trend level (p = .08 and .07, respectively) with the presence of an impulse-control disorder diagnosis (Table 2). Individuals with impulse-control disorders were more likely to report a prior psychiatric hospitalization (75.6% vs. 41.0%; p = .001). No between-group differences in proportions of subjects with prior suicide attempts were observed. Similarly high percentages (approximately 80%) of externalizing disorders were observed in individuals with and without impulse-control disorders (Table 2). A significant association between internalizing disorders (any depressive or anxiety disorder) and impulse-control disorders was observed (78.0% vs. 55.7%; p = .04) (Table 2). This finding appeared attributable to contributions from both depression and anxiety disorders (Table 2) and both girls and boys (Table 3).

Sex differences in psychiatric disorders were observed. Among the sample (with and without impulse-control disorders), girls were more likely than boys to have internalizing disorders and boys were more likely than girls to have externalizing disorders (Table 4). A numerically larger proportion of girls as compared with boys had an impulse-control disorder (48.2% vs. 30.4%; p = .07). Compared with boys, numerically higher proportions of girls reported compulsive buying, trichotillomania, compulsive skin picking, compulsive sexual behaviors, and pyromania, and lower proportions reported pathologic gambling, but these differences did not reach statistical significance except pyromania (12.5% vs. 0%; p = .02). Largely equivalent proportions of girls and boys reported IED and kleptomania.

DISCUSSION

This study is the first to our knowledge to systematically investigate the frequencies and clinical correlates of a broad range of formal impulse-control disorders in adolescents admitted for psychiatric treatment. Our a priori hypotheses were partially supported.

Hypothesis One

Consistent with our first a priori hypothesis, a high proportion of adolescents (40%) was found to have a current impulse-control disorder and a substantially smaller proportion (1%) was given an admitting diagnosis of an impulse-control disorder. These frequencies mirror those observed in our prior study of adult psychiatric inpatients: 31% and 1.5%, respectively.[6] The higher proportion of adolescent as compared with adult psychiatric inpatients reporting impulse-control disorders is consistent with prior reports from clinical and community samples[4,17] and the notion that adolescence represents a developmental period of increased risk-taking.[29–31] The present findings indicate that, like in adults, improved efforts to identify and treat impulse-control disorders in youth hospitalized for psychiatric stabilization are needed.

Important differences were observed when comparing findings from our studies in adolescent and adult psychiatric inpatients. In adults, compulsive buying was the most frequently acknowledged impulse-control disorder, and in adolescents, IED was most common. Several possible non–mutually exclusive explanations exist for these differences. Adolescents as compared with adults typically have less accessible money for buying and thus may not have the same potential to develop problems related to excessive buying.[32] Alternatively, buying behaviors have typically yet to become as habitual in adolescents as in adults,[33] and this difference may contribute to age-related differences in frequencies of compulsive buying. More study into the natural history of compulsive buying and identification of environmental, genetic, and other biological factors influencing susceptibility to the disorder across the lifespan are warranted.

The high frequency of IED in adolescents has theoretical and clinical importance. Among adults, IED has been found to be costly and relatively common in the community, with a U.S. prevalence estimate of 7.3% for lifetime IED.[17] In the community, IED frequently co-occurs with other psychiatric disorders,[17] and IED typically precedes the onset of other psychiatric disorders, with a mean age at onset of 14 years.[7,17] Compared with adulthood, adolescence is a time of intense emotional and physical changes.[34] As such, control mechanisms over often widely fluctuating emotions and related physical responses may be relatively immature, leading to problems with aggressive outbursts characteristic of IED.[17] Given that lifetime proportions of IED were lower in adult psychiatric inpatients (under 10%) than in the current adolescent study (12.7% current in the total sample; 17.3% when excluding subjects with ADHD and conduct disorder who were not diagnosed with IED even if they exhibited IED symptom-

Table 2. Comparison of Adolescent Inpatients With and Without a Current Impulse-Control Disorder

Characteristic[a]	With Impulse-Control Disorder (N = 41)	No Impulse-Control Disorder (N = 61)	Statistic	df	p Value*
Age, mean ± SD (range), y	16.1 ± 1.2 (14–18)	15.6 ± 1.5 (13–18)	−1.79[b]	95.3	.08
Female	27 (65.9)	29 (47.5)	3.32[c]	1	.07
Race/ethnicity			1.12[c]	4	.29
White	30 (73.2)	50 (82.0)			
African American	4 (9.8)	4 (6.6)			
Asian American	1 (2.4)	1 (1.6)			
Latino/Hispanic	3 (7.3)	3 (4.9)			
Native American	3 (7.3)	2 (3.3)			
Prior psychiatric hospitalization	31 (75.6)	25 (41.0)	11.87[c]	1	.001
Prior suicide attempts	13 (31.7)	20 (32.8)	0.01[c]	1	.91
Admission diagnosis					
Any depressive disorder	24 (58.5)	26 (42.6)	2.485[c]	1	.115
Bipolar I or II disorder	7 (17.1)	6 (9.8)	1.155[c]	1	.283
Any mood disorder	31 (75.6)	32 (52.5)	5.350[c]	1	.021
Any psychotic disorder	3 (7.3)	6 (9.8)	0.193[c]	1	.660
Alcohol use disorder	14 (34.1)	21 (34.4)	0.001[c]	1	.977
Drug use disorder	20 (48.8)	39 (63.9)	2.309[c]	1	.129
Any anxiety disorder	7 (17.1)	3 (4.9)	4.097[c]	1	.043
Any eating disorder	2 (4.9)	1 (1.6)	Fisher exact test	NA	.563
Oppositional defiant disorder	4 (9.8)	7 (11.5)	0.075[c]	1	.784
Conduct disorder	2 (4.9)	0 (0)	Fisher exact test	NA	.159
Reactive attachment disorder	1 (2.4)	3 (4.9)	Fisher exact test	NA	.647
Attention-deficit/hyperactivity disorder	8 (19.5)	16 (26.2)	0.615[c]	1	.433
Autism or Asperger's disorder	2 (4.9)	0 (0)	Fisher exact test	NA	.159
Any externalizing disorder[d]	33 (80.5)	49 (80.3)	0.00[c]	1	.98
Any internalizing disorder[e]	32 (78.0)	34 (55.7)	5.57[c]	1	.04

[a]Values shown as N (%) unless otherwise noted.
[b]t Test.
[c]χ^2 Test.
[d]Externalizing disorders include substance use disorders, oppositional defiant disorder, conduct disorder, and attention-deficit/hyperactivity disorder.
[e]Internalizing disorders include any depressive and anxiety disorders.
*p Values < .05 indicate a statistically significant difference between groups.
Abbreviation: NA = not applicable.

atology), the possibility is raised of age-related developmental differences (e.g., development of the prefrontal cortex during the transition to adulthood allowing for greater inhibition of impulses), cohort effects (e.g., violent outbursts being more tolerated in present day society than were previously), and/or other factors (e.g., more frequent incarceration of violent/aggressive individuals as they age, limiting the sample of individuals with IED being hospitalized as adults). Currently, IED is infrequently a target of treatment, even among adults. For example, in adult psychiatric outpatients, IED was found to frequently co-occur with depressive and anxiety disorders, and these diagnoses rather than IED were often the identified target of treatment.[35] As no adolescents in our study had been given a diagnosis of IED upon admission, the data suggest that improved efforts at identifying youth with IED (e.g., through active screening) are needed. Early identification strategies coupled with the delivery of safe and efficacious treatments for IED among youth could result in significant mental health gains across the life span.

Hypothesis Two

Our hypothesis that impulse-control disorder presence would be positively associated with suicide attempts and

prior psychiatric hospitalizations was partially supported. In contrast to our hypothesis, similar proportions of adolescents with and without co-occurring impulse-control disorders acknowledged suicide attempts. This result seemingly contrasts with findings in adults in which impulse-control disorder co-occurrence in individuals with substance use disorders was associated with more frequent suicide attempts.[7] The absence of a difference could reflect a ceiling effect of high rates of suicide attempts (over 30% as compared with 8.4% in a recent study of high school students[36]), the relatively crude nature of the suicide assessment (single question) that did not assess attempt severity, or the similarly high rates of externalizing disorders in the adolescents with and without impulse-control disorders. This last point appears particularly salient given that externalizing behaviors (e.g., behavioral problems, alcohol or drug abuse, criminality) were predictive of suicide and death among former child and adolescent psychiatric inpatients.[37]

In contrast to the similar rates of suicide attempts between adolescents with and without impulse-control disorders, a statistically and clinically significant difference was observed with respect to prior psychiatric hospitalization. Inpatient adolescent psychiatric hospitalizations are costly, and recent efforts have targeted their reduc-

Table 3. Presence of Any Externalizing or Internalizing Disorders in Female and Male Adolescent Inpatients With Versus Without Impulse-Control Disorders

Patient Subgroup	With Impulse-Control Disorder[a]	Without Impulse-Control Disorder[a]	Statistic	df	p Value
Females	N = 27	N = 29			
Any externalizing disorder	19 (70.4)	20 (69.0)	0.01[b]	1	.91
Any internalizing disorder	24 (88.9)	21 (72.4)	2.40[b]	1	.12
Males	N = 14	N = 32			
Any externalizing disorder	14 (100)	29 (90.6)	Fisher exact test	NA	.54
Any internalizing disorder	8 (57.1)	13 (40.6)	1.07[b]	1	.30

[a]Values shown as N (%) unless otherwise noted.
[b]χ^2 Test.
Abbreviation: NA = not applicable.

Table 4. Impulse-Control Disorders in Female and Male Adolescent Psychiatric Inpatients[a]

Disorder[b]	Female (N = 56)	Male (N = 46)	Statistic	df	p Value*
Any externalizing disorder	39 (69.6)	43 (93.5)	9.10[c]	1	.003
Any internalizing disorder	45 (80.4)	21 (45.7)	13.32[c]	1	< .001
Any impulse-control disorder	27 (48.2)	14 (30.4)	3.32[c]	1	.07
Intermittent explosive disorder	7 (12.5)	6 (13.0)	0.007[c]	1	.94
Pathologic skin picking	9 (16.1)	3 (6.5)	2.22[c]	1	.14
Kleptomania	4 (7.1)	5 (10.9)	Fisher exact test	NA	.73
Pyromania	7 (12.5)	0 (0)	Fisher exact test	NA	.02
Compulsive buying	6 (10.7)	1 (2.2)	Fisher exact test	NA	.13
Compulsive sexual behavior	5 (8.9)	0 (0)	Fisher exact test	NA	.06
Pathological gambling	1 (1.8)	4 (8.7)	Fisher exact test	NA	.17
Trichotillomania	3 (5.4)	1 (2.2)	Fisher exact test	NA	.63

[a]Includes all subjects (those with and without impulse-control disorders).
[b]Values shown as N (%).
[c]χ^2 Test.
*p Values < .05 indicate a statistically significant difference between groups.
Abbreviation: NA = not applicable.

tion.[38] The strong positive association between impulse-control disorder presence and prior hospitalization could be explained in several ways. First, impulse-control disorder could be exhibited in youths with particularly severe forms of other mental illnesses. Second, the presence of an impulse-control disorder could complicate treatment outcome in non–impulse-control disorder mental health and addiction domains, as has been observed in adults with psychiatric conditions.[39] Third, the presence of an untreated impulse-control disorder could lead to recurrent psychiatric hospitalization. Irrespective of the reason, improved identification and treatment of impulse-control disorders among youth could improve quality of life and reduce costs associated with multiple hospitalizations. However, a better understanding of the nature of the relationship between impulse-control disorder presence and recurrent psychiatric hospitalizations among youth would inform and guide such efforts.

Hypothesis Three

Our hypothesis that impulse-control disorders would be associated with both internalizing and externalizing disorders was partially supported. No statistically significant difference was observed in externalizing disorders with respect to impulse-control disorder presence. In fact, rates of externalizing disorders were high in both those with and without an impulse-control disorder (80%), suggesting that in general externalizing disorders may be common in adolescents requiring inpatient psychiatric care. A statistically significant association between impulse-control disorders and internalizing disorders (e.g., depressive and anxiety disorders) was observed. This finding appeared attributable to contributions from both depression and anxiety disorders and to both girls and boys. In adults, impulse-control disorders frequently co-occur with internalizing and externalizing disorders in both population-based[5,17] and clinical samples, including psychiatric inpatients.[6] Among adults with depression, those with impulse-control disorders displayed greater impulsivity and experienced more co-occurring psychiatric disorders.[40] Internalizing disorders have been found frequently in adults with impulse-control disorders and their family members.[41] Consistently, shared genetic contributions to the co-occurrence of impulse-control disorders and depression have been reported.[18] As specific genetic and environmental factors interact in the development of internalizing disorders,[42] similar influences warrant consideration for impulse-control disorders.[43] These influences might explain neurobiological similarities between impulse-control disorders and internalizing disorders, e.g.,

the diminished ventromedial prefrontal cortical activation implicated in pathological gambling,[44,45] impulsive aggression,[46] depression,[47] and aggression in individuals with depression.[48] As the relationship between impulse-control disorders and internalizing disorders has implications for the appropriate categorization of impulse-control disorders[39] and because impulse-control disorders as currently aggregated very likely represent a heterogeneous group,[49] more research is needed to better understand the relationship between specific impulse-control disorders and other psychiatric disorders across the lifespan. Efforts to identify genetic and environmental factors predisposing to the co-occurrence of impulse-control disorders and internalizing disorders could lead to improved early intervention strategies and targeted treatment approaches for individuals with either or both types of disorders. As treatments for adults with co-occurring impulse-control disorders and internalizing disorders receive empirical validation,[50] similar strategies need testing in adolescents.

Hypothesis Four

Recent health and science initiatives describe the importance of considering sex differences in biological and medical studies,[51] and this seems particularly relevant to impulse-control disorders, which follow different trajectories across the sexes.[50] Our hypothesis that girls and boys would display differences in patterns of impulse-control disorders and co-occurring disorders, although not reaching statistical significance, was at least partially supported. Consistent with prior studies, girls were more likely than boys to experience internalizing disorders and boys more likely than girls to experience externalizing disorders.[52,53] The finding that girls were marginally more likely to experience impulse-control disorders was not anticipated given that specific impulse-control disorders (pathological gambling, compulsive sexual behaviors) are typically more common in men and some more common in women (compulsive buying) appear less frequently acknowledged by adolescents as compared with adults.[6,28] One reason for these unexpected findings is the lack of epidemiologic data regarding most of the impulse-control disorders. Our assumptions about gender are based on relatively small clinical samples of impulse-control disorder patients, and these may not reflect the larger population of people with these disorders. Consistent with expectations based on studies of adults,[50] a numerically greater proportion of girls reported impulse-control disorders related to grooming behaviors (compulsive skin picking and trichotillomania) and fewer reported pathological gambling, although these differences did not reach statistical significance, likely due to the relatively small sample.

Among the most surprising findings were the relatively high frequencies of compulsive sexual behaviors and pyromania in girls as compared with boys. The high frequency of compulsive sexual behavior in girls versus boys contrasts with the male predominance typically observed in adults.[50] The extent to which compulsive sexual behaviors are evident among teenage girls with less severe mental illness (e.g., psychiatric outpatients) warrants further investigation. Given apparent age-related sex differences in compulsive sexual behaviors, further investigations of the disorder in females and males across developmental epochs are indicated. Given the associated risks for sex-related trauma, sexually transmitted diseases, and undesired teen pregnancies,[54,55] the present findings highlight the need for targeted prevention and treatment strategies for compulsive sexual behaviors, particularly among teenage girls in psychiatric hospitals.

As with compulsive sexual behaviors, pyromania was found more among girls than among boys. Few studies have examined pyromania among adults, and existing studies suggest the disorder is rare.[56] Destructive fire-setting behaviors, including those resulting in arrests for arson, appear particularly common in children and adolescents as compared with adults, and children playing with fire result in hundreds of deaths and hundreds of millions of dollars in damages annually in the United States alone.[57] Although some studies have found fire-setting to predominate in male versus female adolescents,[58] others have shown age-related sex differences in playing with fire. In a study of 18- to 19-year-olds, more men reported having played with fire in childhood and more women reported playing with fires currently.[59] As with other impulse-control disorders among women,[60] pyromania among girls might reflect a mixture of impulsive and planned thrill-seeking to alleviate dysphoric states.[61] Together, the findings emphasize the importance of studying impulse-control disorders and their relationships with other psychiatric disorders in youth in a sex-specific manner in order to optimize prevention and treatment strategies.

Limitations and Strengths

This study has several limitations. First, the accuracy of impulse-control disorder diagnosis could have been influenced by multiple factors. Diagnoses were based on subject report, and collateral information was not obtained. Although we believe this strategy facilitated more honest responding, verifying information from parents or other sources was not obtained. Because impulse-control disorders may be denied, observed frequencies may underestimate actual impulse-control disorder frequencies. Excluding specific impulse-control disorder diagnoses for patients with bipolar disorder, conduct disorder, and ADHD may have limited the identification of clinically relevant impulse-control disorders. This point appears particularly relevant to IED in that the high frequency observed may represent an underestimation of clinically relevant cases. Alternatively, adolescents may have exag-

gerated symptoms, e.g., to appear defiant or garner sympathy. Clinical studies tend to observe high rates of co-occurrence due to Berkson's paradox and clinical biases (i.e., studies done in clinical settings tend to be biased toward finding higher comorbidity rates).

Second, the generalizability of the results to adolescent patients admitted to psychiatric facilities against their will, psychiatric outpatients, or adolescents in the community is unclear and warrants further study. Third, the instruments used to diagnose impulse-control disorders lack rigorously tested psychometric properties among adolescents. Nonetheless, classification accuracy of the MIDI with respect to clinical diagnosis by a psychiatrist with expertise in impulse-control disorder treatment compared favorably with findings from a similar study in adults.[6] Fourth, without the use of more rigorous instruments to assess depression and anxiety, it is possible that internalizing disorders, particularly in males, may have been underdiagnosed. Fifth, the sample was recruited from a single site in the north-central United States. Additional studies in other geographic locations are needed to examine the generalizability of the findings. Sixth, additional relevant information related to impulse-control disorder and other psychiatric symptomatology (e.g., symptom severity or neuropsychological functioning) was not available. Future studies should examine other clinically relevant measures to gauge impulse-control disorder and non–impulse-control disorder illness severities and their relationship to other clinically relevant measures like quality of life.

Despite the limitations, the study has multiple strengths, including being the first to systematically examine a broad range of formal impulse-control disorders among psychiatric inpatient adolescents, the use of structured screens and psychiatric interviews blinded to screening diagnosis, a relatively large sample of adolescents with impulse-control disorders, and the examination of impact on psychiatric rehospitalization, relationships with other psychiatric disorders, and sex specificity. The findings that a substantial portion of adolescent inpatients have impulse-control disorders and impulse-control disorder presence is associated with recurrent hospitalization are clinically important. The nature of the associations between impulse-control disorders and other psychiatric disorders not only has important prevention and treatment implications, but also provides guidance for categorization of impulse-control disorders and development of treatments for impulse-control disorders.[39] Additional research and clinical efforts are needed to better understand, identify, prevent, and treat impulse-control disorders among youth populations.

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