

# The Prevalence and Correlates of *DSM-IV* Intermittent Explosive Disorder in the National Comorbidity Survey Replication

Ronald C. Kessler, PhD; Emil F. Coccaro, MD; Maurizio Fava, MD; Savina Jaeger, PhD;  
Robert Jin, MS; Ellen Walters, MS

**Context:** Little is known about the epidemiology of intermittent explosive disorder (IED).

**Objective:** To present nationally representative data on the prevalence and correlates of *DSM-IV* IED.

**Design:** The World Health Organization Composite International Diagnostic Interview was used to assess *DSM-IV* anxiety disorders, mood disorders, substance use disorders, and impulse control disorders.

**Setting:** The National Comorbidity Survey Replication, a face-to-face household survey carried out in 2001-2003.

**Participants:** A nationally representative sample of 9282 people 18 years and older.

**Main Outcome Measure:** Diagnoses of *DSM-IV* IED.

**Results:** Lifetime and 12-month prevalence estimates of *DSM-IV* IED were 7.3% and 3.9%, with a mean 43 life-

time attacks resulting in \$1359 in property damage. Intermittent explosive disorder-related injuries occurred 180 times per 100 lifetime cases. Mean age at onset was 14 years. Sociodemographic correlates were uniformly weak. Intermittent explosive disorder was significantly comorbid with most *DSM-IV* mood, anxiety, and substance disorders. Although the majority of people with IED (60.3%) obtained professional treatment for emotional or substance problems at some time in their life, only 28.8% ever received treatment for their anger, while only 11.7% of 12-month cases received treatment for their anger in the 12 months before interview.

**Conclusions:** Intermittent explosive disorder is a much more common condition than previously recognized. The early age at onset, significant associations with comorbid mental disorders that have later ages at onset, and low proportion of cases in treatment all make IED a promising target for early detection, outreach, and treatment.

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## Author Affiliations:

Department of Health Care Policy, Harvard Medical School, Boston (Drs Kessler and Jaeger, Mr Jin, and Ms Walters); the Clinical Neuroscience and Psychopharmacology Research Unit, Department of Psychiatry, Pritzker School of Medicine, University of Chicago, Chicago, Ill (Dr Coccaro); the Depression Clinical and Research Program, Massachusetts General Hospital, Boston (Dr Fava).

**I**NTERMITTENT EXPLOSIVE DISORDER (IED), as operationalized in *DSM-IV*, is characterized by recurrent episodes of serious assaultive acts that are out of proportion to psychosocial stressors and that are not better accounted for either by another mental disorder or by the physiological effects of a substance with psychotropic properties. Despite the fact that IED, or some version of this diagnosis, has always been included in the *DSM*, changes in criteria in the various editions over the years have resulted in relatively little being known about the incidence or prevalence of IED either in clinical samples or in the general population. In *DSM-III*, for example, IED could not be diagnosed in patients with generalized aggression or impulsivity. Given that most individuals with serious aggressive outbursts also have generalized aggression or impulsivity, this restriction resulted in a significant under-

estimation of the IED syndrome in *DSM-III*.<sup>1</sup> While this problem was remedied in the *DSM-IV*, other uncertainties remain, such as the nature and threshold frequency of aggressive acts needed to meet criteria for a diagnosis of IED.

To our knowledge, only 2 published studies exist on the prevalence and correlates of *DSM-IV* IED.<sup>2,3</sup> One examined 1300 patients in a university-faculty private practice and found a 3.1% prevalence of current IED.<sup>3</sup> The other examined a nonprobability subsample of 253 respondents in the Baltimore Epidemiologic Catchment Area Follow-Up study and found lifetime and 1-month prevalence estimates of 4.0% and 1.6%.<sup>2</sup> That study also found the small number of respondents who met criteria for IED to have an early age at onset (usually in childhood or adolescence), a persistent course, significant psychosocial impairment, and little treatment for problems associated with IED.

In the context of a growing recognition that violence is an important component of mental disorder and that IED is the DSM disorder most directly linked to impulsive violence, the recently completed **National Comorbidity Survey Replication<sup>4</sup> (NCS-R)** included an assessment of **DSM-IV IED**. The current report presents initial NCS-R results concerning the prevalence and correlates of this disorder in the general population of the United States.

## METHODS

### SAMPLE

The NCS-R is a nationally representative, face-to-face household survey (n=9282) conducted between February 2001 and April 2003 using a multistage clustered-area probability sampling design.<sup>5,6</sup> The response rate was 70.9%. Recruitment began with a letter and study fact brochure followed by an in-person interviewer visit in which study aims and procedures were explained and verbal informed consent was obtained. Respondents received \$50 for participation. Consent was verbal rather than written to be consistent with the recruitment procedures in the baseline NCS<sup>7</sup> for purposes of trending. The NCS-R recruitment and consent procedures were approved by human subjects committees of Harvard Medical School (Boston, Mass) and the University of Michigan (Ann Arbor).

All respondents were administered a part 1 diagnostic interview, as described later, while a subset of 5692 respondents also received a part 2 interview that assessed additional disorders and correlates. Part 2 respondents included all who met lifetime criteria for any part 1 disorder plus a probability sample of other part 1 respondents. The part 1 sample was weighted to adjust for differential probabilities of selection within households and for differences in intensity of recruitment effort among hard-to-recruit cases. The part 2 sample was additionally weighted for the higher selection probabilities of part 1 respondents with a lifetime disorder. A final weight adjusted the sample to match the 2000 census population on the cross-classification of a number of geographic and sociodemographic variables. All analyses reported in this article use these weights. More complete information on the NCS-R sampling design and weighting is reported elsewhere.<sup>6</sup>

### DIAGNOSTIC ASSESSMENT

The NCS-R diagnoses are based on version 3.0 of the World Health Organization Composite International Diagnostic Interview (CIDI),<sup>8</sup> a fully structured lay-administered diagnostic interview that generates diagnoses according to both *International Statistical Classification of Diseases, 10th Revision*<sup>9</sup> and *DSM-IV*<sup>10</sup> criteria. *DSM-IV* criteria are used in the current report. The diagnoses include the 3 broad classes of disorder assessed in previous CIDI surveys (anxiety disorders, mood disorders, and substance disorders) plus a group of disorders that share a common feature of difficulties with impulse control (IED and 3 retrospectively reported childhood-adolescent disorders—oppositional defiant disorder, conduct disorder, and attention-deficit/hyperactivity disorder). Diagnostic hierarchy rules and organic exclusion rules were used in making diagnoses. As detailed elsewhere,<sup>11</sup> blind clinical reinterviews using the Structured Clinical Interview for *DSM-IV* (SCID)<sup>12</sup> with a probability subsample of NCS-R respondents found generally good concordance between *DSM-IV* diagnoses based on the CIDI and the SCID for anxiety, mood, and substance use disorders. The CIDI diagnoses of impulse control disorders were not validated because the SCID contains no assessment of these disorders.

**DSM-IV criterion A for IED** requires “several discrete episodes of failure to resist aggressive impulses that result in serious assaultive acts or destruction of property.” This criterion was operationalized in the CIDI by requiring the respondent to report at least 1 of 3 types of anger attacks: (1) “when all of a sudden you lost control and broke or smashed something worth more than a few dollars;” (2) “when all of a sudden you lost control and hit or tried to hurt someone;” and (3) “when all of a sudden you lost control and threatened to hit or hurt someone.” Three or more lifetime attacks were required to operationalize the *DSM-IV* requirement of “several” attacks. We also created a narrow definition of lifetime IED that requires 3 attacks in the same year. Although this temporal clustering is not included in *DSM-IV*, there is precedent for its use in clinical studies of IED.<sup>2</sup> Building on this distinction, 12-month prevalence was defined using 3 successively more stringent requirements. The broad definition required 3 lifetime attacks and at least 1 attack in the past 12 months. The intermediate definition required 3 lifetime attacks in the same year and at least 1 attack in the past 12 months. The narrow definition required 3 attacks in the past 12 months.

**DSM-IV criterion B for IED** requires that the aggressiveness is “grossly out of proportion to any precipitating psychosocial stressor.” This criterion was operationalized in the CIDI by requiring the respondent to report either that they “got a lot more angry than most people would have been in the same situation” or that the attack occurred “without good reason” or “in situations where most people would not have had an anger attack.”

**DSM-IV criterion C for IED** requires that the “aggressive episodes are not better accounted for by another mental disorder and are not due to the direct physiological effects of a substance or a general medical condition.” This criterion was only partially operationalized in the CIDI. Two sets of questions asked if anger attacks usually occur either when respondents have been drinking or using drugs or when they are in an episode of being sad or depressed. Positive responses were followed with probes about whether the attacks ever occurred at times other than when the respondent was under the influence of alcohol or drugs or depressed. If not, the case was considered to be due to substance use disorder and/or depression. A third set of questions asked about organic causes as follows: “Anger attacks can sometimes be caused by physical illnesses such as epilepsy or a head injury or by the use of medications. Were your anger attacks ever caused by physical illness or medications?” Positive responses were followed with probes that inquired about the nature of the illness and/or medication and whether the respondent ever had attacks other than during the course of the illness or under the influence of the medication. If not, the case was considered to be due to an organic cause.

Although the CIDI did not include parallel questions that excluded respondents whose anger attacks occurred in the course of bipolar disorder (BPD), we imposed a post hoc rule to make this exclusion based on evidence that IED has a particularly strong relationship with BPD.<sup>13-15</sup> This rule excluded cases from a diagnosis of IED if they met lifetime criteria for mania or hypomania, reported that the ages at onset and recency of their IED fell within the ages at onset and recency of their mania or hypomania, and reported that the number of years they experienced manic or hypomanic episodes was greater than or equal to the number of years they had anger attacks. This rule artificially rules out the possibility of comorbidity between IED and BPD. However, we judged this bias to be the lesser of 2 evils in comparison with the possibility of overestimating the prevalence of IED by failing to exclude anger attacks due to BPD.

### OTHER MEASURES

Four other sets of measures are used in the current report: measures of onset and course of IED, sociodemographic variables, im-

pairment associated with IED, and treatment. The measures of onset and course are based on retrospective reports about age at onset, number of lifetime attacks, number of years with at least 1 attack, and questions about attacks in the 12 months before the interview.

The sociodemographic variables include age (18-24, 25-34, and 35-44 years), sex, race/ethnicity (Non-Hispanic white, Non-Hispanic black, Hispanic, and other), education (0-11, 12, 13-15, and  $\geq 16$  years), marital status (married/cohabitating, previously married, or never married), employment status (working, student, homemaker, retired, or other), and urbanicity (central city, suburb, and adjacent-rural area).

The assessment of impairment includes questions about lifetime impairment as well as impairment in the past 12 months. The lifetime questions ask about the financial value of all the things the respondent ever broke or damaged during an anger attack and the number of times either the respondent or someone else had to seek medical attention because of an injury caused by one of the respondent's anger attacks. The 12-month questions ask respondents to rate the extent to which their IED interfered with their life and activities in the worst month of the past year using the Sheehan Disability Scale.<sup>16</sup> The latter are visual analog scales with a score range of 0 to 10 that ask how much a focal disorder interfered with home management, work, social life, and personal relationships using the response options none (0), mild (1-3), moderate (4-6), severe (7-9), and very severe (10).

Part 2 respondents were asked whether they ever received treatment for "problems with your emotions or nerves or your use of alcohol or drugs" and, if so, treatment by each of a number of different professionals in a variety of treatment settings.<sup>17</sup> For each positive response, follow-up questions were asked about most recent treatment. Responses were used to distinguish treatment in 5 sectors: psychiatrist, nonpsychiatrist mental health specialist (eg, psychologist), general medical (eg, primary care doctor), human services (eg, religious or spiritual advisor), and complementary/alternative medicine (eg, massage therapist, self-help group). In addition, respondents who met criteria for IED were asked if they ever obtained professional treatment for their anger problems and, if so, whether they were in treatment in the past 12 months.

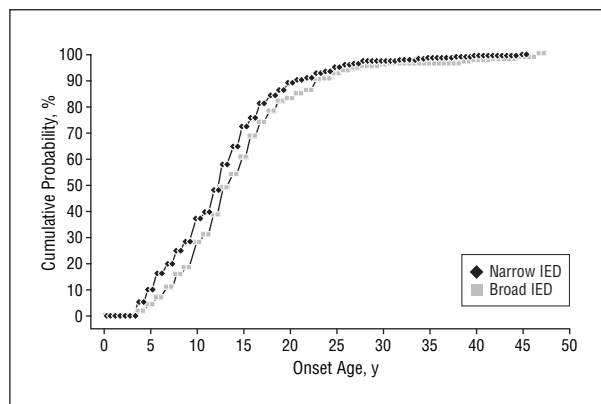
## ANALYSIS METHODS

Prevalence estimates were calculated using cross-tabulations. Cumulative lifetime age at onset curves were calculated using the actuarial method.<sup>18</sup> Associations of IED with sociodemographic variables and comorbid DSM-IV disorders were examined using logistic regression analysis. Temporal priorities of IED in comparison with comorbid conditions were investigated by comparing individual-level retrospective age at onset reports across disorders. Impairment and treatment were examined using analysis of variance. Significance tests were carried out using the Taylor series linearization method<sup>19</sup> implemented in the SUDAAN software package<sup>20</sup> to adjust for the weighting and clustering of the NCS-R data. Multivariate significance was evaluated using Wald  $\chi^2$  tests based on Taylor series design-based coefficient variance-covariance matrices. Statistical significance was consistently evaluated at the .05 level with 2-sided tests.

## RESULTS

### PREVALENCE AND ONSET

Lifetime prevalence estimates of broadly and narrowly defined IED (with standard errors in parentheses) were 7.3% (0.4) and 5.4% (0.3), respectively. Twelve-month prevalence estimates were 3.9% (0.3) using the broad defini-



**Figure.** Age at onset distributions of narrow and broad-only lifetime DSM-IV intermittent explosive disorder (IED) in 9282 people.

tion, 3.5% (0.3) using the intermediate definition, and 2.7% (0.3) using the narrow definition. Mean age at onset of first anger attack was in early adolescence for both narrowly defined lifetime cases (13.5 years) and for cases that met only the broad lifetime definition (broad only, 14.8 years;  $\chi^2=2.5$ ;  $P=.12$ ). The full age at onset distributions were quite similar for narrow and broad-only lifetime cases (**Figure**).

The majority of people with lifetime narrow (67.8%) and broad-only (71.2%) IED had a history of interpersonal violence during their anger attacks, while most others (20.9% narrow, 14.9% broad only) had a history of threatening interpersonal violence during their attacks. Only a small minority of respondents (11.4% narrow, 13.9% broad only) reported attacks that never included either interpersonal violence or threats of interpersonal violence.

### LIFETIME PERSISTENCE AND SEVERITY

Narrowly defined lifetime IED was significantly more persistent than broad-only IED. This can be seen indirectly by calculating the ratios of any 12-month anger attack to the lifetime prevalence estimates reported in the last section. These are 64.3% (SE 2.7) for narrow and 24.3% (SE 3.3) for broad-only lifetime IED ( $z=9.0$ ;  $P<.001$ ). Higher persistence of narrow than broad-only cases can be seen more directly by comparing mean number of lifetime attacks (56.2 vs 7.0;  $z=7.8$ ;  $P<.001$ ), mean number of years with at least 1 attack (11.8 vs 6.2;  $z=8.5$ ;  $P<.001$ ), and highest number of attacks in a single year (27.8 vs 1.6;  $z=6.4$ ;  $P<.001$ ) (**Table 1**). Persistence was greatest among respondents whose attacks featured both interpersonal violence and property damage (eg, an average of 59.7 lifetime attacks vs 24.4-30.2 in other subgroups;  $F_{4,620}=6.8$ ;  $P<.001$ ) (more detailed results available on request).

Narrow cases were also more severe, on average, than broad-only cases, as indicated both by a higher mean monetary value of objects damaged during anger attacks (\$1602.70 vs \$447.20;  $z=6.3$ ;  $P<.001$ ) and by a higher mean number of times someone needed medical attention because of an anger attack (233.0 vs 37.2 times per 100 cases;  $z=3.8$ ;  $P<.001$ ). Severity, like persistence, was highest among respondents whose attacks featured both violence and property damage (eg, an average of \$1780 in

**Table 1. Course and Severity of Lifetime *DSM-IV* Intermittent Explosive Disorder**

	Narrow, Mean (SE)*	Broad Only, Mean (SE)*	Broad, Mean (SE)*	z Score	P Value
Course					
No. of lifetime attacks	56.2 (6.3)†	7.0 (0.5)	43.6 (4.4)	7.8	<.001
No. of years with attacks	11.8 (0.6)†	6.2 (0.5)	10.3 (0.5)	8.5	<.001
Highest No. of annual attacks	27.8 (4.1)†	1.6 (0.1)	21.1 (2.8)	6.4	<.001
Severity					
Property damage, \$†	1602.70 (134.9)	447.20 (135.3)	1359.90 (110.3)	6.3	<.001
Medical attention, per 100 cases§	233.0 (50.5)	37.2 (12.2)	180.6 (36.7)	3.8	<.001
Sample size	463	162	625		

\*Narrow indicates 3 or more annual attacks in at least 1 year of life; broad only, 3 or more lifetime attacks without ever having as many as 3 attacks in a single year; and broad, narrow or broad only.

†Significant difference in means between the narrow and broad-only subsamples at the .05 level, 2-sided test.

‡Estimated cost of all the things ever damaged or broken in an anger attack.

§Number of times during an anger attack someone was hurt badly enough to need medical attention per 100 cases of intermittent explosive disorder.

**Table 2. Duration and Impairment of 12-Month *DSM-IV* Intermittent Explosive Disorder**

	Narrow, % (SE)*	Intermediate Only, % (SE)*	Broad Only, % (SE)*	Broad, % (SE)*	F <sub>2,347</sub>	P Value
12-mo persistence						
No. of 12-mo attacks	11.8 (1.4)†	1.3 (0.1)	1.3 (0.1)	8.5 (0.9)	26.7	<.001
No. of weeks with attacks	19.6 (2.8)†	1.5 (0.1)	1.3 (0.1)	13.9 (1.9)	23.9	<.001
Severe role impairment (Sheehan Disability Scale <sup>16</sup> )						
Home	14.8 (2.6)	10.9 (3.7)	4.9 (3.3)	12.9 (1.9)	3.2	.20
Work	11.7 (2.6)	12.2 (3.9)	5.6 (3.2)	11.1 (2.2)	1.7	.44
Interpersonal	27.5 (3.8)†	18.5 (4.7)	13.1 (5.0)	24.1 (3.1)	7.7	.02
Social	22.2 (3.5)	17.2 (4.4)	14.9 (5.1)	20.4 (2.8)	1.9	.38
Summary	40.4 (3.6)†	25.8 (4.7)	19.6 (6.5)	35.1 (2.9)	11.4	.003
Sample size	230	71	49	350		

\*Narrow indicates 3 or more 12-month attacks; intermediate only, lifetime narrow and 1 or 2 12-month attacks; broad only, lifetime broad and 1 or 2 12-month attacks; and broad, narrow or intermediate only or broad only.

†Significant difference in prevalence across the narrow, intermediate-only, and broad-only subsamples at the .05 level, 2-sided test.

property damage vs \$462-\$463 in other subgroups that included property damage;  $F_{2,622}=37.6$ ;  $P<.001$  and an average of 180 instances of someone requiring medical attention per 100 cases vs 34-229 in other subgroups that included violence;  $F_{2,622}=14.2$ ;  $P=.001$ ) (more detailed results available on request). These differences can be explained by frequency of attacks. Indeed, the mean value of lifetime property damage per attack is actually lower for narrow IED (\$22) than for broad-only IED (\$64). The same is true for injuries requiring medical attention (4.1 per 100 attacks for narrow IED and 5.3 for broad-only IED).

## 12-MONTH DURATION AND ROLE IMPAIRMENT

The average number of anger attacks in the past year was much higher for 12-month narrow (11.8) than intermediate-only (1.3) or broad-only (1.3) cases ( $F_{2,347}=26.7$ ;  $P<.001$ ) (**Table 2**). Similar variation existed in number of weeks with an attack ( $F_{2,347}=23.9$ ;  $P<.001$ ). Severe 12-month role impairment, as assessed by the Sheehan Disability Scale, in comparison, varied much less across the 3 12-month IED subsamples. In fact, the proportion of 12-month cases reporting severe role impairment during the worst month of the year did not differ meaningfully across these sub-

samples for 3 of the 4 Sheehan Disability Scale domains ( $F_{2,347}=1.7$ -3.2;  $P=.20$ -.44). The exception was the domain of interpersonal relationships, where severe impairment was considerably more common for narrow (27.5%) and intermediate-only (18.5%) than broad-only (13.1%) cases ( $F_{2,347}=7.7$ ;  $P=.02$ ).

## SOCIODEMOGRAPHIC CORRELATES

Statistically significant sociodemographic correlates of broadly defined lifetime IED included male, young, "other" race/ethnicity (ie, not non-Hispanic black, non-Hispanic white, or Hispanic), low education, married, not retired, not a homemaker, and low family income (**Table 3**). The odds ratios (ORs) for these sociodemographic correlates were mostly modest in magnitude (1.5-2.0), with the exception of age (1.6-43), where the contrast category of respondents 60 years and older had a very low reported prevalence (2.1%) (Table 2). Among respondents who met broad lifetime criteria for IED, none of these sociodemographic variables distinguished narrow from broad-only cases. No significant sociodemographic correlates were found for 12-month persistence among lifetime cases (results available on request). Nor



**Table 3. Sociodemographic Correlates of Lifetime *DSM-IV* Intermittent Explosive Disorder**

	Broad* (n = 5692)		Narrow: Broad Only* (n = 625)	
	% (SE)	OR (95% CI)	% (SE)	OR (95% CI)
Sex				
Male	9.3 (0.7)	1.7 (1.3-2.1)†	74.1 (3.5)	1.1 (0.7-1.7)
Female	5.6 (0.4)	1.0	74.7 (2.1)	1.0
$\chi^2_1$		22.7		0.1
P value		<.001		.72
Age, y				
18-29	12.1 (1.1)	4.3 (2.1-9.0)†	79.1 (2.6)	1.5 (0.5-4.5)
30-44	9.0 (0.9)	2.9 (1.3-6.3)†	72.5 (3.5)	1.0 (0.4-3.0)
45-59	5.3 (0.5)	1.6 (0.8-3.5)†	69.7 (4.2)	1.0 (0.3-2.8)
60+	2.1 (0.4)	1.0	69.8 (7.3)	1.0
$\chi^2_3$		44.8		3.4
P value		<.001		.33
Race/ethnicity				
Non-Hispanic black	6.8 (1.0)	0.8 (0.6-1.2)	74.4 (4.5)	1.0 (0.6-1.7)
Non-Hispanic white	6.8 (0.5)	1.0	73.8 (2.7)	1.0
Hispanic	9.3 (1.2)	0.9 (0.7-1.3)	76.5 (4.9)	1.0 (0.5-1.7)
Other	13.5 (2.6)	1.9 (1.2-3.0)	74.8 (6.3)	0.9 (0.4-1.9)
$\chi^2_3$		14.0		0.2
P value		.003		.98
Education, y				
0-11	9.4 (1.0)	2.0 (1.4-3.0)†	82.8 (3.6)	2.1 (1.0-4.6)
12	6.9 (0.7)	1.4 (1.0-1.8)†	73.9 (4.2)	1.3 (0.6-2.8)
13-15	8.5 (0.9)	1.6 (1.2-2.2)†	73.5 (4.2)	1.4 (0.8-2.5)
16+	5.0 (0.5)	1.0	73.5 (5.5)	1.0
$\chi^2_3$		17.2		4.2
P value		.001		.24
Marital status				
Never married	9.6 (1.1)	0.7 (0.5-0.9)†	76.4 (3.4)	0.9 (0.6-1.5)
Previously married	5.0 (0.5)	0.8 (0.7-1.0)†	76.5 (4.8)	1.2 (0.6-2.3)
Married-cohabitating	7.2 (0.4)	1.0	72.6 (3.1)	1.0
$\chi^2_2$		9.1		0.5
P value		.01		.79
Occupational status				
Employed	8.2 (0.5)	1.0	73.0 (2.3)	1.0
Student	9.2 (4.1)	0.8 (0.3-2.2)	76.0 (7.7)	0.9 (0.4-1.9)
Homemaker	4.5 (1.1)	0.6 (0.4-1.0)†	89.0 (6.4)	2.9 (0.7-12.8)
Retired	1.5 (0.4)	0.4 (0.2-0.8)†	57.1 (12.4)	0.5 (0.1-2.1)
Other	11.0 (1.5)	1.3 (0.9-1.8)	81.5 (4.3)	1.4 (0.7-2.7)
$\chi^2_4$		15.9		3.2
P value		.003		.52
Family income				
Low	8.7 (0.9)	1.5 (1.1-2.0)†	80.0 (3.5)	1.3 (0.7-2.4)
Low average	7.4 (0.8)	1.3 (0.9-1.8)	74.9 (2.9)	1.1 (0.5-2.3)
High average	7.7 (0.5)	1.3 (1.0-1.8)	73.6 (3.9)	1.2 (0.6-2.3)
High	5.5 (0.7)	1.0	67.0 (5.8)	1.0
$\chi^2_3$		8.0		1.7
P value		.045		.64
Urbanicity				
Major metropolitan city	6.2 (0.7)	1.0	79.6 (4.3)	1.0
Other city	8.3 (1.1)	1.4 (1.0-2.1)	68.6 (6.4)	0.5 (0.2-1.2)
Major metropolitan suburb	7.3 (0.9)	1.2 (0.9-1.8)	73.5 (3.4)	0.7 (0.3-1.6)
Other suburb	8.4 (0.8)	1.5 (1.0-2.1)	71.4 (4.5)	0.7 (0.3-1.4)
Rural	6.8 (0.6)	1.2 (0.8-1.7)	77.2 (4.2)	0.9 (0.4-1.9)
$\chi^2_4$		6.0		3.8
P value		.20		.44
Overall				
$\chi^2$		456.4		55.8
P value		<.001		<.001

Abbreviations: CI, confidence interval; OR, odds ratio.

\*Narrow indicates 3 or more annual attacks in at least 1 year of life; broad only, 3 or more lifetime attacks without ever having as many as 3 attacks in a single year; and broad, narrow or broad only.

†Significant at the .05 level, 2-sided test.

**Table 4. Lifetime Comorbidity of *DSM-IV* Intermittent Explosive Disorder With Other *DSM-IV* Disorders**

	Broad* (n = 5692)		Narrow: Broad Only* (n = 625)	
	% (SE)	OR (95% CI)	% (SE)	OR (95% CI)
Mood disorders				
Major depressive disorder	37.3 (2.3)	2.8 (2.2-3.6)†	37.9 (2.7)	1.2 (0.7-2.1)
Dysthymia	9.7 (1.5)	3.2 (2.3-4.5)†	10.0 (1.8)	1.3 (0.7-2.7)
Any mood disorder	37.4 (2.2)	2.8 (2.2-3.5)†	38.1 (2.6)	1.2 (0.7-2.2)
Anxiety disorders				
Agoraphobia	6.5 (1.1)	3.4 (2.3-5.1)†	6.8 (1.3)	1.3 (0.6-3.1)
Generalized anxiety disorder	18.7 (1.8)	3.6 (2.8-4.7)†	20.7 (2.3)	2.1 (1.3-3.2)†
Obsessive-compulsive disorder	4.4 (1.5)	2.5 (1.1-5.7)†	4.5 (1.9)	1.1 (0.2-6.9)
Panic disorder	11.9 (1.6)	3.3 (2.2-4.8)†	12.7 (1.8)	1.5 (0.8-2.6)
Posttraumatic stress disorder	15.2 (1.5)	3.0 (2.3-4.1)†	16.6 (2.0)	1.7 (0.9-3.2)
Social phobia	28.3 (1.5)	3.1 (2.5-3.7)†	29.3 (1.9)	1.3 (0.8-2.1)
Specific phobia	24.0 (1.9)	2.4 (2.0-3.0)†	25.9 (2.4)	1.6 (1.0-2.7)
Separation anxiety disorder	10.5 (1.1)	2.9 (2.2-4.0)†	10.5 (1.4)	1.0 (0.5-1.8)
Any anxiety disorder	58.1 (1.9)	3.8 (3.1-4.6)†	60.2 (2.4)	1.5 (1.0-2.3)
Impulse control disorders				
Oppositional defiant disorder	24.6 (2.2)	3.4 (2.5-4.6)†	27.4 (2.8)	1.9 (1.1-3.5)†
Conduct disorder	24.2 (2.6)	3.5 (2.7-4.6)†	27.2 (3.1)	2.0 (1.1-3.5)†
Attention-deficit/hyperactivity disorder	19.6 (2.0)	3.3 (2.5-4.4)†	22.5 (2.6)	2.6 (1.3-4.9)†
Any impulse control disorder	44.9 (2.2)	4.1 (3.3-5.0)†	49.5 (2.8)	2.1 (1.2-3.7)†
Substance use disorders				
Alcohol abuse	32.9 (3.0)	3.1 (2.3-4.1)†	37.5 (3.8)	2.6 (1.7-4.2)†
Alcohol dependence with abuse	17.0 (2.0)	3.6 (2.5-5.0)†	18.6 (2.5)	1.6 (1.0-2.7)
Drug abuse	21.8 (2.3)	2.7 (2.0-3.6)†	23.6 (3.1)	1.5 (0.9-2.7)
Drug dependence with abuse	10.5 (1.4)	3.4 (2.3-5.0)†	11.4 (1.8)	1.5 (0.7-3.2)
Any substance disorder	35.1 (2.9)	2.9 (2.2-3.9)†	39.6 (3.7)	2.4 (1.5-3.8)†
Any disorder				
At least 1 disorder	81.8 (2.0)	5.6 (4.1-7.5)†	84.3 (2.3)	1.8 (1.1-3.0)†
Exactly 1 disorder	16.1 (1.4)	0.8 (0.7-1.0)	14.1 (1.4)	0.6 (0.3-0.9)
Exactly 2 disorders	17.4 (1.6)	1.9 (1.4-2.4)†	17.2 (2.0)	0.9 (0.5-1.6)
≥3 disorders	48.3 (2.5)	4.7 (3.6-6.0)†	53.0 (3.1)	2.3 (1.4-3.6)†

Abbreviations: CI, confidence interval; OR, odds ratio.

\*Narrow indicates 3 or more annual attacks in at least 1 year of life; broad only, 3 or more lifetime attacks without ever having as many as 3 attacks in a single year; broad, narrow or broad only.

†Significant at the .05 level, 2-sided test, controlling for age, sex, and race/ethnicity.

were meaningful sociodemographic correlates found that distinguished narrow 12-month IED from intermediate-only or broad-only cases (results available on request).

## COMORBIDITY

The vast majority (81.8%) of respondents with lifetime broad IED met criteria for at least 1 of the other lifetime *DSM-IV* disorders assessed in the NCS-R (**Table 4**). Indeed, broad lifetime IED was significantly and positively related to each of these other disorders after controlling for age, sex, and race/ethnicity, with ORs in the range of 2.4 to 3.6. The ORs involving narrow IED were consistently higher than those involving broad-only IED, but the ratios of these 2 ORs were elevated only modestly for mood disorders (1.2-1.3) and most anxiety disorders (1.0-1.7). The ratios were more substantially elevated in comparison with generalized anxiety disorder (2.1), all impulse control disorders (1.9-2.6), and alcohol abuse (2.6).

We also examined comorbidity of 12-month IED with other 12-month *DSM-IV* disorders among respondents with a lifetime history of both disorders in the pair. Sparse data made it necessary to focus on broad disorder classes

(ie, any mood disorder, any anxiety disorder, any substance use disorder). As with lifetime comorbidity, ORs involving broad IED were meaningfully elevated (mood, 2.7; anxiety, 2.2; substance, 2.2), while the ORs involving intermediate-only and narrow IED were generally similar in magnitude to those of broad IED (results available on request).

## TREATMENT

Although a majority (60.3%) of respondents with broad lifetime IED received treatment for emotional problems at some time in their life, only a minority (28.8%) were ever treated specifically for IED (**Table 5**). Probabilities of receiving treatment overall as well as within particular services sectors did not differ significantly depending on broad vs narrow diagnostic criteria. One third (33.6%) of respondents with broad 12-month IED received treatment for emotional problems in the year before interview, but only one third of that number (11.7% of all 12-month cases) received treatment specifically for IED. As with lifetime treatment, probabilities of overall and sector-specific 12-month treatment did not differ sig-

**Table 5. Lifetime and 12-Month Treatment of *DSM-IV* IED**

	Narrow, % (SE)*	Broad Only, % (SE)*	Broad, % (SE)*		F <sub>1,623</sub>	P Value
<b>Lifetime</b>						
Psychiatrist	30.4 (2.5)	22.3 (3.9)	28.3 (2.4)		3.7	.06
Other mental health specialist	28.5 (2.1)	26.2 (3.4)	27.9 (1.7)		0.3	.59
General medical	27.4 (2.2)	25.9 (3.9)	27.0 (1.8)		0.1	.75
Human services	17.4 (2.2)	13.9 (3.3)	16.5 (2.0)		0.8	.39
CAM	18.1 (1.9)	15.2 (2.8)	17.4 (1.7)		0.8	.38
Any treatment	61.6 (2.4)	56.5 (4.5)	60.3 (2.3)		1.2	.27
Any treatment for IED	32.4 (1.8)†	18.3 (3.3)	28.8 (1.8)		12.4	.001
Sample size	463	162	625			
	Narrow, % (SE)‡	Intermediate Only, % (SE)‡	Broad Only, % (SE)‡	Broad, % (SE)‡	F <sub>2,347</sub>	P Value
<b>12-Month</b>						
Psychiatrist	9.5 (2.0)	10.9 (4.1)	6.7 (3.1)	9.5 (1.7)	0.4	.68
Other mental health specialist	12.5 (2.0)	7.4 (3.2)	12.4 (4.7)	11.4 (1.7)	0.7	.51
General medical	15.8 (3.2)	10.2 (3.1)	22.4 (6.1)	15.5 (2.3)	1.6	.21
Human services	6.7 (2.3)	8.3 (3.7)	12.4 (5.4)	7.7 (1.9)	0.6	.55
CAM	3.6 (1.2)	3.7 (2.2)	5.2 (3.4)	3.8 (1.1)	0.2	.85
Any treatment	33.2 (3.7)	31.2 (6.1)	40.4 (7.2)	33.6 (2.7)	0.5	.61
Any treatment for IED	13.2 (2.1)	7.7 (3.1)	10.0 (4.4)	11.7 (1.8)	1.3	.29
Sample size	230	71	49	350		

Abbreviations: CAM, complementary/alternative medicine; IED, intermittent explosive disorder.

\*Narrow indicates 3 or more 12-month attacks; intermediate only, lifetime narrow and 1 or 2 12-month attacks; broad only, lifetime broad and 1 or 2 12-month attacks; broad, narrow or broad only.

†Significant difference in prevalence across the narrow, intermediate-only, and broad-only subsamples at the .05 level, 2-sided test.

‡Narrow indicates 3 or more 12-month attacks; intermediate only, lifetime narrow and 1 or 2 12-month attacks; broad only, lifetime broad and 1 or 2 12-month attacks; broad, narrow or intermediate only or broad only.

nificantly across cases that met broad, intermediate, or narrow diagnostic criteria.

## COMMENT

There are 2 noteworthy limitations of the data analyzed herein. First, the diagnoses were based on fully structured lay interviews for which no information is available either on test-retest reliability or validity. Second, estimates of onset and course were based on retrospective rather than prospective reports. A limitation of the data analysis is that many separate significance tests were computed, introducing the possibility of some false-positive associations. Caution is consequently needed in interpreting results prior to independent replication.

Within the context of these limitations, *DSM-IV* IED was estimated to be a fairly common disorder, with lifetime prevalence of 5.4% to 7.3% and 12-month prevalence of 2.7% to 3.9% (equivalent to approximately 11.5 million-16.0 million lifetime cases and 5.9 million-8.5 million 12-month cases in the United States). These prevalence estimates are somewhat higher than those found in the 2 previously published studies of *DSM-IV* IED.<sup>2,3</sup> The Baltimore Epidemiologic Catchment Area study findings suggest that prevalence would have been roughly 25% higher if we had also included cases that met research criteria for IED.<sup>1</sup> The latter extend the definition of IED to include recurrent aggressive outbursts that do not rise to the level examined in this study (eg, verbal

aggression against others in the absence of either threats or physical aggression against people or objects). Because the latter behaviors are significantly impairing and have been shown to respond to psychopharmacologic treatment,<sup>21</sup> a rationale exists for including them in the definition of IED in *DSM-V*.

Although we found a number of sociodemographic correlates of IED, these associations are modest in substantive terms. As an indication of this fact, the Pearson contingency coefficient, a generalization of the  $\phi$  coefficient for polychotomous predictors,<sup>22</sup> is only in the range 0.04 to 0.05 for the significant sociodemographic correlates of lifetime broad IED. This means that IED is very widely distributed in the population rather than concentrated in any 1 segment of society.

We also found that IED usually begins in childhood or adolescence, is quite persistent over the life course (averages of 6.2-11.8 years with attacks), is associated with substantial role impairment, and has high comorbidity with other *DSM-IV* mood, anxiety, and substance use disorders. Although these NCS-R results cannot legitimately be compared with the results obtained in previous studies of patient samples, similar patterns have consistently been found in clinical studies using mostly older diagnostic criteria.<sup>1,23-27</sup>

As described in the section on measures, explicit questions to exclude anger attacks due to substance use disorders and major depression were included in the CIDI and a post hoc exclusion was made for BPD. Because

McElroy et al<sup>13</sup> found that some patients with comorbid IED and BPD have anger attacks when they are not in manic or hypomanic episodes, our blanket exclusion of cases with comorbid BPD underestimated the prevalence of IED. We did not make comparable exclusions of comorbid impulse control disorders stipulated in *DSM-IV* as exclusions for IED (oppositional defiant disorder, conduct disorder, and attention-deficit/hyperactivity disorder) based on the fact that *DSM-IV* says that an additional diagnosis of IED is warranted in the presence of "discrete episodes of failure to resist aggressive impulses." An observation indirectly supporting this decision is that IED was reported to be much more persistent than comorbid impulse control disorders.

*DSM-IV* also excludes anger attacks due to antisocial personality disorder and borderline personality disorder. The NCS-R did not include a core assessment of Axis II disorders, making it impossible to consider these exclusions. However, the Baltimore Epidemiologic Catchment Area study, which focused on personality disorders, found unexpectedly low proportions of respondents with IED who also met criteria for antisocial personality disorder or borderline personality disorder,<sup>2</sup> suggesting that the failure to exclude these cases in the NCS-R might not have had a major effect on results. *DSM-IV* also excludes anger attacks due to nonaffective psychosis, but the estimated prevalence of nonaffective psychosis was so low in the NCS-R that this exclusion made no meaningful difference to the results reported herein.<sup>28</sup>

In evaluating the NCS-R finding that IED is significantly comorbid with a wide range of other *DSM-IV* disorders, it is important to recognize that the CIDI is a fully structured instrument that cannot make the subtle distinctions made in clinical interviews. This means that comorbidity is probably overestimated in the NCS-R. Importantly, the ORs of IED with other CIDI or *DSM-IV* disorders are not markedly higher than those among the other disorders themselves. Nonetheless, the documentation of comorbidity between CIDI and a wide range of other disorders is consistent with the finding that undiagnosed IED is common in clinical samples.<sup>29</sup> Although such associations are more intuitive with other impulse control disorders and substance use disorders than with anxiety or mood disorders, evidence exists in clinical studies of an association between violent behavior and such anxiety disorders as posttraumatic stress disorder<sup>30</sup> and obsessive-compulsive disorder,<sup>31</sup> while anecdotal reports link panic attacks to violent behavior.<sup>32</sup> Clinical evidence of an association between violent behavior and depression is even stronger.<sup>33</sup>

The finding that the ORs of IED with impulse control (3.3-3.5) and substance use (2.7-3.6) disorders were not higher than those with mood (2.8-3.2) and anxiety (2.4-3.6) disorders raises the possibility that IED may be as much related to affective instability and dysregulation as to problems with impulse control. This possibility is consistent with the observation that affective instability is a risk factor for impulsive self-injury and suicidal behavior.<sup>34</sup> Impulsivity itself is associated with neuroticism<sup>35</sup> and is known to be a risk factor for depression,<sup>36</sup> suggesting that the joint effects of impulsivity and affective instability on IED are likely to be complex.

The early age at onset of IED is an important finding with regard to comorbidity because it means that IED is temporally primary to many of the other *DSM-IV* disorders with which it is comorbid.<sup>37</sup> Within-person analyses (detailed results available on request) found that this was especially true for major depression, generalized anxiety disorder, panic disorder, and substance use disorders, where the vast majority of respondents reported that their IED began at an earlier age than these other disorders. This raises the possibility that IED might be either a risk factor or a risk marker for temporally secondary comorbid disorders.<sup>38</sup> Consistent with this possibility, a recent family study showed that the offspring of adults with depression with anger attacks have higher delinquency and aggressive behavior than the children of adults with depression without anger attacks.<sup>39</sup> This suggests that intermittent explosive behavior might emerge quite early in subjects at risk of the subsequent onset of mood disorders. However, we are aware of no systematic research on the possibility that IED is a risk marker for temporally secondary disorders. The 1 published study that we are aware of that examined the family aggregation of IED found high intergenerational continuity of the disorder independent of comorbid conditions,<sup>37</sup> which means that common genetic factors are unlikely to account for the comorbidity of IED with other *DSM* disorders.

This last observation suggests that the association of IED with the later first onset of secondary comorbid disorders is unlikely to be due to common underlying genetic risk factors or to phenotypic factors that are under strong genetic control, such as an impulsive personality style. If IED is a causal risk factor, in comparison, it might promote secondary disorders by leading to divorce, financial difficulties, and stressful life experiences that promote secondary disorders. If this last scenario is correct, then the fact that so few people obtain treatment for IED becomes even more important because it means that an opportunity is being missed to intervene in the disorder at a point when it might still be possible to prevent the onset of secondary disorders.

A detailed analysis of delays in seeking treatment for IED found that the minority of people with IED who obtain professional help for their anger attacks typically wait a decade or more after onset before first treatment contact.<sup>40</sup> Given the differences in the typical age at onset of IED compared with temporally secondary comorbid disorders,<sup>41</sup> this means that initial treatment usually occurs only after the onset of most temporally secondary disorders and that the focus of the treatment is probably on the comorbid disorders. This interpretation is consistent with the finding that the majority of people with IED were found to receive treatment for emotional problems at some time in their life but not for their anger. It is not clear from this result whether the low treatment of anger is due to greater reluctance to seek professional help for anger than other emotional problems or due to failure to conceptualize anger as a mental health problem. Given that so many people with IED obtain treatment for other emotional problems, a question can also be raised why treating mental health professionals do not include anger as a focus of their treatment or if the anger problems of their patients with IED are not recog-



nized. We have no data in the NCS-R to adjudicate among these possibilities.

Another issue of importance for diagnosis and treatment of IED relates to the distinction between broad and narrow definitions. The stipulation in *DSM-IV* that the presence of only 3 serious lifetime episodes of aggression may be sufficient to make the diagnosis of an aggression disorder is one of the few instances in which *DSM-IV* does not have a temporal clustering requirement (eg, 3 episodes in 1 year). Even though the most severe form of IED in our study (narrow) is much more persistent than its less severe form (broad only), the 2 did not differ significantly in most measures of functional impairment. As such, these data raise questions as to when to treat individuals with IED. Prospective treatment data will be needed to resolve this uncertainty. A related question for future research is whether successful early detection, outreach, and treatment of IED would help prevent the onset of secondary comorbid disorders. Given the age at onset distribution of IED, early detection would most reasonably take place in schools and might well be an important addition to ongoing school-based violence prevention programs.<sup>42,43</sup>

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**Correspondence:** Ronald C. Kessler, PhD, Department of Health Care Policy, Harvard Medical School, 180 Longwood Ave, Boston, MA 02115 (kessler@hcp.med.harvard.edu).

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