

# Intermittent Explosive Disorder

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## Introduction

Anger has been linked with psychopathology since classical times (Novaco 2010), a tie that remains embedded in the English language with the word ‘mad’ being a colloquial term for both anger and insanity. Anger and its behavioural expression (e.g., irritability, hostility, and aggression) may accompany the clinical presentation of many mental disorders. It is for this reason that it has been long debated as to whether aggression is just a correlate of other mental disorders, or whether it might, under some circumstances, constitute a mental disorder in its own right.

It is not just aggression (‘anger turned outwards’) that has been linked with psychopathology; psychodynamic theory has long focused on ‘anger turned inwards’ (repression) as a central feature of depression (Busch 2009). But it is interesting to note that although the idea that repression of anger is bad for health (physical and mental) has had enormous influence on popular views of anger and health (Tavris 1989; Lilienfeld *et al.* 2011), repression of anger does not feature in current classifications of mental disorders. Aggression though, does, with impulsive aggression being the central feature of the diagnosis of intermittent explosive disorder (IED).

There has been much less research on the epidemiology of IED compared with other psychiatric disorders, principally due to significant problems with diagnostic criteria in earlier versions of DSM (Coccaro *et al.* 1998). These problems revolved around the difficulty of determining the frequency and type of aggressive outbursts that would warrant classification as a mental disorder, as well as the problem of how to differentiate the disorder from personality styles characterized by recurrent aggressive behaviour. Although debated (Coccaro 2012), DSM-IV criteria are sufficiently well operationalized to have allowed research into the epidemiology of IED. IED was included in DSM-IV as a subsidiary disorder (not elsewhere classified) but it is classified in DSM-5 within the category of disruptive, impulse-control, and conduct disorders.

Aggression can be classified as defensive, premeditated, or impulsive; defensive aggression falls within the bounds of normal behaviour, while premeditated and impulsive aggression are both considered pathological (Coccaro 2012). Impulsive aggression can be thought of as a spontaneous aggressive response to provocation with loss of behavioural control, while premeditated aggression is considered a more planned or intentional form of aggression. Premeditated aggression is viewed as falling within the personality disorder spectrum, so only impulsive aggression is currently potentially classifiable as a mental disorder. Coccaro and colleagues have collected a large body of evidence indicating that impulsive aggression can be distinguished from premeditated aggression on a range of social and biological factors and in terms of responsiveness to treatment (Coccaro 2012). It is this kind of evidence that has been crucial to the case for the inclusion of IED in the DSM classification of mental disorders.

The essential feature of IED as defined in DSM-IV is the occurrence of repeated episodes of impulsive aggression resulting in verbal or physical assaults or property destruction. The impulsive outbursts that characterize IED have rapid onset with little or no prodromal period and usually last fewer than 30 minutes. To meet criteria for the disorder these outbursts need to be greatly out of proportion to any precipitating stressor and to not be better accounted for by another mental disorder. Although not conclusive, there is some evidence that IED is not simply the pathological end of the continuum of impulsive aggression that occurs in the general population, but rather a distinct clinical entity with distinguishing characteristics such as early onset, family history, and help-seeking (Ahmed *et al.* 2010).

The first large population based studies of DSM-IV IED occurred in the United States as part of the World Mental Health (WMH) Surveys Initiative. The National Comorbidity Survey Replication (NCS-R) found a lifetime prevalence of 5.4% (Kessler *et al.*

2006), and the adolescent supplement found a lifetime prevalence of 5.3% (McLaughlin *et al.* 2012). Because extensive research has linked prior exposure to violence with subsequent perpetration of violence (Song *et al.* 1998; McKinney *et al.* 2009), and some studies have also linked prior trauma exposure with IED diagnosis (Fincham *et al.* 2009; Nickerson *et al.* 2012), it has been hypothesized that IED might be more prevalent in countries with higher rates of violence, trauma exposure, or civil conflict (Fincham *et al.* 2009; Al-Hamzawi *et al.* 2012; Axinn *et al.* 2013; Rees *et al.* 2013). In apparent support of this hypothesis a high 12-month prevalence of IED (9.5%) was found in Timor Leste where it was interpreted by the researchers as ‘a reaction to extreme forms of injustice’ (Rees *et al.* 2013). A high rate of IED was also observed in an earlier study in South Africa (Fincham *et al.* 2009) that has been widely cited as supportive of the hypothesis that war and civil conflict could elevate prevalence of IED. However, the high estimate in the South African study has turned out to be erroneous<sup>1</sup> and the study in Timor Leste used a very different assessment instrument from the Composite International Diagnostic Interview (CIDI) used in the NCS-R and other WMH surveys, making comparison difficult. Moreover, 12-month IED was only 1.5% in the Iraq WMH survey (Al-Hamzawi *et al.* 2012), inconsistent with the hypothesis. As noted, interpretation of variation in IED prevalence across existing studies is difficult given differences in measurement of IED and application of diagnostic hierarchy rules. The WMH Surveys Initiative, in which DSM-IV IED was assessed in 16 countries, therefore provides an important opportunity to examine the epidemiology of IED in a range of countries using consistent methods and diagnostic criteria.

In this chapter we provide information on the cross-national epidemiology of IED examining prevalence, age-of-onset, socio-demographic correlates, comorbidity, associated impairment, and treatment. The analyses have been undertaken in a way that is consistent with the other mental disorders in this book, except that we provide a more detailed breakdown of IED comorbidity with specific mental disorders due to the limited information on this in general population samples in the published literature on IED. We also include two IED-specific tables. One of these provides information on the number and type of aggressive episodes during

the worst week of the 12-month prior to interview among those meeting 12-month criteria. The other table is of associations between lifetime traumatic event exposure and subsequent IED onset: we include this due to the strong research interest in the relationship between prior trauma exposure and IED and limited data on it from other sources.

## Method

This chapter includes the data from all 16 of the 26 countries included in this volume that assessed IED. These countries include six low/lower-middle-income countries (Colombia, Iraq, Nigeria, Peru, People’s Republic of China, Ukraine), five upper-middle-income countries (Brazil, Bulgaria, Lebanon, Romania, South Africa) and five high-income countries (Japan, Northern Ireland, Poland, Portugal, the United States).

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 was operationalized in the CIDI by requiring the respondent to report at least three attacks in the same year of at least one of three types of anger attacks: (i) ‘when all of a sudden you lost control and broke or smashed something worth more than a few dollars’; (ii) ‘when all of a sudden you lost control and hit or tried to hurt someone’; and (iii) ‘when all of a sudden you lost control and threatened to hit or hurt someone’. Twelve-month diagnosis was assigned if those meeting lifetime criteria reported at least three attacks in the past 12-months, and 30-day diagnosis was assigned if those meeting 12-month criteria reported an anger attack in the past 30 days.

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 that the attack occurred ‘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 was assessed through a series of questions (see Kessler *et al.* 2006 for details) that ruled IED diagnosis out if anger attacks occurred exclusively

<sup>1</sup> [https://www.hcp.med.harvard.edu/wmh/ftpd/Fincham\\_et\\_al\\_2009\\_erratum.pdf](https://www.hcp.med.harvard.edu/wmh/ftpd/Fincham_et_al_2009_erratum.pdf)

when respondents had been drinking or using drugs, when they were in a depressive or manic episode, or as a consequence of an organic cause such as epilepsy, head injury, or use of medications.

This classification of IED is based on the ‘narrow’ definition of IED reported in the NCS-R (Kessler *et al.* 2006), but for the data presented here we have applied an additional impairment criterion that required respondents to report that their anger attacks caused at least some degree of interference with their work, social life, or relationships (Scott *et al.* 2016). This makes the diagnosis of IED in this chapter more conservative than in earlier reports based on WMH surveys data (Kessler *et al.* 2006, 2012; Yoshimasu & Kawakami 2011; Al-Hamzawi *et al.* 2012), but this inclusion of an impairment criterion is consistent with the diagnostic criteria for other DSM-IV disorders.

How does this definition of IED compare to DSM-5 criteria? DSM-5 IED criteria recognize two different patterns of aggressive outburst: high frequency/low intensity (criterion A1: *non-destructive* verbal or physical aggression occurring at least twice weekly for at least three months) or low frequency/high intensity (criterion A2: at least three *destructive* outbursts within a year-long period) (Coccaro *et al.* 2014b). DSM-5 criteria also require that the outbursts cause functional impairment, consistent with the algorithm used here. But although our diagnostic algorithm requires three aggressive outbursts within one year there was insufficient information in the CIDI on the lifetime frequency of specific types of aggressive outburst to develop an algorithm consistent with DSM-5’s specification of criterion A1 and A2.

## Results

### Prevalence and Age-of-Onset

There is quite substantial variation in the prevalence of IED across countries (Table 13.1). Lifetime prevalence is 0.8% in all countries combined and ranges from a low of less than 0.1% in Nigeria to a high of 2.7% in the United States. The average 12-month prevalence in all countries combined is 0.4%, with 0.3% meeting criteria for 30-day prevalence. A little over half (53.6%) of those with lifetime disorders report symptoms in the past 12-months and a substantial proportion (61.9%) of the 12-month cases report symptoms in the past 30 days; these results indicate that IED can be moderately persistent. Lifetime prevalence of IED varies significantly ( $F = 19.1$ ,  $P < 0.001$ ) across country income groups

showing a gradient from lower prevalence in low/lower-middle-income countries to higher prevalence in the high-income countries. However, the higher average prevalence in high-income countries is strongly influenced by the high prevalence in the United States, with none of the other high-income countries having prevalence approaching that of the United States. By contrast, the indirect indicators of disorder persistence (12-month/lifetime) and episode persistence (30-day/12-month) are higher in the low/lower-middle-income countries than in the high-income countries, with a significant inverse gradient across country income groups for episode persistence ( $F = 4.3$ ,  $P = 0.014$ ).

IED is one of the earlier onset disorders, typically beginning in late adolescence, with a median age-of-onset in all countries combined of 17 (16 in high-income countries; 18 in low/lower-middle-income countries and 19 in upper-middle-income countries), with a fairly narrow inter-quartile range across countries of 13–23 (Appendix Table 13A.1). Projected lifetime risk of IED is 0.9 for all countries combined, only slightly higher than the lifetime prevalence estimate of 0.8; this reflects the young age-of-onset.

### Type of Anger Attacks in the Past 12 Months

Respondents reporting IED symptoms in the prior 12 months were asked to think about the week during the 12 months when they had their most violent aggressive outburst, and to indicate the number and type of angry outbursts they experienced during that week. Respondents could report more than one type of attack. As the results indicate, the most commonly reported attacks (by 235/357) are the less destructive types involving slamming a door, kicking a chair, or throwing clothes. But a substantial number report that they broke something or several things during the angry outburst and 42% (51+100/357) report hurting someone. It is evident that in each category of attack the means are higher than the median, indicating that a small group of individuals report multiple experiences of each type of attack anger, with some individuals reporting more than one instance of arson, torturing an animal or hurting someone during the specified week.

### Role Impairment

The proportion of those with 12-month IED who report severe impairment in at least one domain is 38.9% in all countries combined, varying (non-significantly) from 26.7% in upper-middle-income countries to 36.5%

**Table 13.1** Prevalence of DSM-IV intermittent explosive disorder (IED) in the World Mental Health surveys

Country	Lifetime prevalence <sup>a</sup>		12-month prevalence <sup>b</sup>		30-day prevalence <sup>c</sup>		12-month prevalence of IED among lifetime cases		30-day prevalence of IED among 12-month cases		Sample size used
	%	SE	%	SE	%	SE	%	SE	%	SE	
<b>Low/lower-middle-income countries</b>	<b>0.6</b>	<b>0.1</b>	<b>0.4</b>	<b>0.0</b>	<b>0.3</b>	<b>0.0</b>	<b>60.1</b>	<b>3.8</b>	<b>70.4</b>	<b>5.0</b>	<b>36,498</b>
Colombia	1.2	0.2	0.5	0.1	0.4	0.1	41.9	6.1	75.7	10.0	4,426
Iraq	0.4	0.2	0.4	0.2	0.3	0.1	93.9	6.1	86.6	10.9	4,332
Nigeria	0.0	0.0	0.0	0.0	0.0	0.0	79.6	20.7	25.9	27.2	6,752
Peru	0.6	0.2	0.2	0.1	0.2	0.1	37.7	10.3	72.1	13.6	3,930
PRC (Beijing/Shanghai)	0.5	0.1	0.3	0.1	0.2	0.1	52.8	13.9	71.5	13.5	5,201
PRC (Shenzhen)	0.7	0.1	0.6	0.1	0.4	0.1	83.9	5.7	63.7	10.8	7,132
Ukraine	1.1	0.2	0.6	0.1	0.4	0.1	56.3	7.9	69.7	9.9	4,725
<b>Upper-middle-income countries</b>	<b>0.7</b>	<b>0.1</b>	<b>0.3</b>	<b>0.1</b>	<b>0.2</b>	<b>0.0</b>	<b>48.3</b>	<b>5.6</b>	<b>71.6</b>	<b>6.7</b>	<b>19,884</b>
Brazil	0.7	0.1	0.4	0.1	0.2	0.1	53.0	10.8	49.5	14.2	5,037
Bulgaria	0.2	0.1	0.2	0.1	0.1	0.1	68.8	17.2	84.6	11.4	5,318
Lebanon	0.6	0.1	0.3	0.1	0.2	0.1	44.4	12.6	89.9	10.9	2,857
Romania	0.5	0.2	0.3	0.2	0.3	0.2	66.0	18.7	93.1	7.3	2,357
South Africa	1.2	0.3	0.5	0.2	0.3	0.1	37.9	9.6	70.9	9.0	4,315
<b>High-income countries</b>	<b>1.1</b>	<b>0.1</b>	<b>0.6</b>	<b>0.1</b>	<b>0.3</b>	<b>0.0</b>	<b>51.4</b>	<b>3.8</b>	<b>52.2</b>	<b>4.4</b>	<b>31,681</b>
Japan	0.4	0.1	0.2	0.1	0.1	0.0	66.6	11.8	39.5	16.2	4,129
Northern Ireland	1.1	0.2	0.4	0.1	0.3	0.1	31.7	7.5	76.2	12.2	4,340
Poland	0.2	0.0	0.1	0.0	0.0	0.0	49.4	13.2	36.0	16.4	10,081
Portugal	0.5	0.1	0.3	0.1	0.1	0.1	45.9	11.7	46.3	24.0	3,849
United States	2.7	0.2	1.5	0.2	0.8	0.1	55.0	4.8	51.9	5.0	9,282
<b>All countries combined</b>	<b>0.8</b>	<b>0.0</b>	<b>0.4</b>	<b>0.0</b>	<b>0.3</b>	<b>0.0</b>	<b>53.6</b>	<b>2.5</b>	<b>61.9</b>	<b>3.2</b>	<b>88,063</b>
<b>WHO regions<sup>d</sup></b>											
Region of the Americas	1.6	0.1	0.8	<b>0.1</b>	0.5	0.1	51.7	3.7	55.4	4.4	22,675
African region	0.5	0.1	0.2	0.1	0.1	0.1	40.1	9.1	66.1	9.8	11,067
Western Pacific region	0.6	0.1	0.4	0.1	0.3	0.1	72.5	6.0	61.7	8.1	16,462
Eastern Mediterranean region	0.5	0.1	0.3	0.1	0.3	0.1	69.0	9.8	87.7	8.2	7,189
Western European region	0.9	0.1	0.3	0.1	0.2	0.1	35.9	6.3	64.8	13.0	8,189
Eastern European region	0.4	0.0	0.2	0.0	0.2	0.0	57.8	6.1	69.6	7.0	22,481
<b>Comparison between countries<sup>e</sup></b>	<b>F<sub>16,v</sub> = 21.9*, P &lt; 0.001</b>		<b>F<sub>16,v</sub> = 7.9*, P &lt; 0.001</b>		<b>F<sub>16,v</sub> = 8.3*, P &lt; 0.001</b>		<b>F<sub>16,v</sub> = 2.4*, P = 0.002</b>		<b>F<sub>16,v</sub> = 1.4, P = 0.153</b>		
<b>Comparison between low-, middle- and high-income country groups<sup>e</sup></b>	<b>F<sub>2,v</sub> = 19.1*, P &lt; 0.001</b>		<b>F<sub>2,v</sub> = 5.5*, P = 0.044</b>		<b>F<sub>2,v</sub> = 0.9, P = 0.405</b>		<b>F<sub>2,v</sub> = 2.0, P = 0.133</b>		<b>F<sub>2,v</sub> = 4.3*, P = 0.014</b>		
<b>Comparison between WHO regions<sup>e</sup></b>	<b>F<sub>5,v</sub> = 26.1*, P &lt; 0.001</b>		<b>F<sub>5,v</sub> = 8.3*, P &lt; 0.001</b>		<b>F<sub>5,v</sub> = 5.4*, P &lt; 0.001</b>		<b>F<sub>5,v</sub> = 4.1*, P = 0.001</b>		<b>F<sub>5,v</sub> = 1.5, P = 0.186</b>		

\*Significant at the 0.05 level, two-sided test.

<sup>a</sup>Lifetime narrow IED: lifetime IED with hierarchy and required three or more anger attacks in at least one year of life.<sup>b</sup>Twelve-month narrow IED: 12-month IED with hierarchy and required three or more anger attacks in the past 12 months.<sup>c</sup>Thirty-day narrow IED: 30-day IED with hierarchy and required three or more anger attacks in the past 12 months.<sup>d</sup>**Region of the Americas** (Colombia, Brazil, Peru, United States); **African region** (South Africa, Nigeria); **Western Pacific region** (PRC (Shenzhen), PRC (Beijing and Shanghai), Japan); **Eastern Mediterranean region** (Iraq, Lebanon); **Western European region** (Northern Ireland, Portugal); **Eastern European region** (Romania, Poland, Bulgaria, Ukraine).<sup>e</sup>Wald design-corrected F-tests were used to determine if there is variation in prevalence estimates across countries. The denominator degree of freedom, v, is 770.

PRC: People's Republic of China.

**Table 13.2 Type and number of anger attacks during the week of the past year containing the most violent attack, among those with 12-month IED (n = 357)**

Type of anger attack	Number of attacks in the week				
	n	Mean	SE	Median	(IQR)
Slam a door, kick a chair, or throw clothes in anger	235	5.5	0.6	2	(1–5)
Break something in anger	170	3.2	0.3	1	(1–2)
Break several things in anger	104	2.7	0.3	1	(1–3)
Purposely set fire or destroy someone else's property	29	1.8	0.4	1	(1–2)
Purposely injure or torture an animal	16	2.1	0.3	1	(1–4)
Threaten someone	178	4.3	0.5	1	(1–3)
Hurt someone so badly that they needed medical attention	51	1.4	0.1	1	(1–2)
Hurt someone badly, but not enough to need medical attention	100	2.7	0.3	1	(1–3)

in low/lower-middle-income countries and 44.7% in high-income countries (Appendix Table 13A.2). In all countries combined, severe impairment is reported more frequently in the social and relationship domains than in the work and home domains, although this pattern of stronger impairment in the social domains is less evident in the upper-middle-income countries. The highest levels of impairment are in the Ukraine, with 56.6% reporting severe impairment, followed by 50.1% of those with IED in the United States reporting severe impairment.

## Socio-demographic Correlates

The likelihood of having the disorder at all (lifetime IED column) is significantly greater among males, the young, the unemployed, those with less education, and those who are divorced or separated (Table 13.3), with young age and low education being the strongest correlates. The correlates of current (30-day) burden of IED are for the most part similar to those of lifetime IED, indicating that the onset profile largely drives the current burden profile. One exception to that, however, is household income; high-average household income, relative to high household income, is associated with decreased likelihood of both current burden of IED and episode persistence, although this pattern is only significant for current burden (OR 0.5).

No socio-demographic correlates are significantly associated with odds of IED persistence (12-month/lifetime). One correlate that is notable by its absence of association with persistence is gender. As mentioned

above, being male is associated with both lifetime IED and current burden, but the likelihood of disorder or episode persistence is just as high among women as among men.

## Comorbidity

As evident in Table 13.4, more than three-quarters (81.7%) of respondents with lifetime IED meet criteria for at least one other lifetime disorder. Alcohol abuse is the single most common comorbid disorder (36.5% have lifetime comorbid alcohol abuse) closely followed by depression (35.2%). The most common class of comorbid disorders is anxiety disorders (58.5%), reflecting the large number of anxiety disorders. It may seem as if there is not especially high comorbidity with the childhood disruptive behaviour disorders (conduct disorder and oppositional defiance disorder) with which IED might have been thought to have most in common, with only around 16% of those with IED having lifetime comorbidity with one of these disorders. However, it is not possible to draw any conclusions about the relative strength of associations between IED and specific types of comorbid disorders from this table as it only provides a descriptive picture of the comorbidity burden in IED. The disruptive behaviour disorders are not very common, and this has to be taken into account in evaluating associations between IED and specific comorbidities. Bivariate associations between all of the mental disorders are presented in Chapter 20, and they show that IED is somewhat more strongly associated with conduct



disorder and oppositional defiant disorder than with other disorders.

As expected from the adolescent median age-of-onset, IED onset precedes onset of comorbid mood disorders in 66.9% of cases, but only precedes comorbid anxiety disorders in 26.7% of cases due to the earlier onset of the two most prevalent anxiety disorders, specific phobia, and social anxiety disorder. IED onset also typically precedes substance-use disorders onset (74.0% of lifetime cases), but does not precede most disruptive behaviour disorders – although it does precede conduct disorder in a substantial minority of cases (45%).

## Associations of Traumatic Events with Onset of IED

This next set of results examines associations between lifetime traumatic events and the likelihood of developing IED, due to strong theoretical interest in these relationships. From discrete-time survival analyses that examined traumatic events as predictors of first onset of IED (see Scott *et al.* 2016 for details on the analysis), including control for demographic variables (age, gender, education, marital status, employment status) and country, we find that most types of lifetime traumas are associated with subsequent first onset of IED (Table 13.5). The traumas with the strongest associations with IED onset are being physically abused as a child (OR 3.6) and witnessing family violence as a child (OR 3.5). The next column of data in Table 13.5 shows results from models that included all traumatic events together, in addition to the controls mentioned above. In this model several individual traumatic events lose significance as predictors, indicating that their significance in the bivariate models is due to their co-occurrence with childhood physical abuse and other traumatic events. Childhood physical abuse remains the strongest predictor of IED both in terms of the experience of physical abuse as a child (OR 2.2) and the witnessing of it (OR 2.3). Non-combat war experience, intimate or sexual violence, and other (private) events are also associated with odds of IED in the multivariate model with ORs all <2.0. Combat experience is protective in the multivariate model (OR 0.3). The final column of data shows that odds of IED onset increase substantially with the experience of an increasing number of different types of traumatic events, ranging from OR of 3.1 for one type of event to 8.0 for four or more types of events.

## Treatment

Few with IED receive treatment, with only 25% of those with 12-month IED (of any severity) reporting some kind of treatment in the health care sector (Appendix Table 13A.3). Treatment in the non-health care sector is rare. Treatment is especially low in the low/lower-middle-income countries with 12% reporting treatment in the health care sector, compared with 28.4% reporting treatment in the upper-middle-income countries and 33.5% reporting treatment in the high-income countries (Appendix Table 13A.3). In all countries combined, treatment rates are similar for IED cases with mild versus moderate impairment (17.9% and 18.6%, respectively), but a higher proportion (30.5%) of those in the severe impairment category report treatment.

## Discussion

As with all the mental disorders considered in this volume, it should be borne in mind that their retrospective assessment may quite substantially underestimate lifetime prevalence (Moffitt *et al.* 2010; Takayanagi *et al.* 2014) so the prevalence estimates provided here should be considered conservative. In addition, despite methodological improvement in age-of-onset recall accuracy as detailed in Chapter 3, it is likely that some inaccuracies in age-of-onset timing remain and this limitation may have affected time-lagged associations between traumatic events and IED onset as well as the estimates of temporal priority in the comorbidity analyses. It should also be noted that IED was not included in the clinical reappraisal studies that helped confirm the clinical validity of the CIDI diagnoses in the WMH surveys (Haro *et al.* 2006) and this is an important area for future research.

Within the context of those limitations, we found the lifetime prevalence of conservatively defined DSM-IV IED to be 0.8% averaged across all countries, indicating that it is one of the rarer disorders measured in the WMH surveys. Although prevalence varied considerably across countries, it is interesting to note that we did not find higher prevalence rates in countries characterized by war, terrorism, and conflict, as has been hypothesized (Fincham *et al.* 2009; Al-Hamzawi *et al.* 2012; Rees *et al.* 2013). The variation in IED prevalence across countries may in part reflect variation in willingness to disclose mental health symptoms or the performance of the diagnostic interview (Kessler & Üstün 2008; Yoshimasu & Kawakami 2011). That said, the pattern we see of prevalence being positively

**Table 13.3** Bivariate associations between socio-demographic correlates and DSM-IV intermittent explosive disorder (IED), all countries combined

Correlates	30-day IED <sup>a</sup>		Lifetime IED <sup>b</sup>		12-month IED among lifetime cases <sup>c</sup>		30-day IED among 12-month cases <sup>c</sup>	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
<b>Age-cohort</b>								
18–29	<b>5.0*</b>	(2.0–12.6)	<b>10.4*</b>	(6.8–16.0)				
30–44	<b>4.1*</b>	(1.7–10.0)	<b>5.5*</b>	(3.7–8.2)				
45–59	<b>3.1*</b>	(1.2–8.0)	<b>3.4*</b>	(2.3–5.2)				
60+	<b>1.0</b>		<b>1.0</b>					
<b>Age-cohort difference<sup>d</sup></b>	$\chi^2_3 = 13.9^*, P = 0.003$		$\chi^2_3 = 144.0^*, P < 0.001$					
<b>Age-of-onset</b>								
Early					<b>2.2*</b>	(1.3–3.8)	<b>0.4*</b>	(0.2–1.0)
Early-average					<b>1.7*</b>	(1.0–2.8)	<b>0.8</b>	(0.3–1.8)
Late-average					<b>1.8*</b>	(1.1–3.0)	<b>0.6</b>	(0.2–1.4)
Late					<b>1.0</b>		<b>1.0</b>	
<b>Age-of-onset difference<sup>d</sup></b>					$\chi^2_3 = 8.9^*, P = 0.031$		$\chi^2_3 = 5.5, P = 0.140$	
<b>Time since onset (continuous)</b>					<b>0.99*</b>	(0.97–1.00)	<b>1.03*</b>	(1.01–1.06)
<b>Gender</b>								
Female	<b>0.7*</b>	(0.5–0.9)	<b>0.7*</b>	(0.6–0.8)	<b>1.0</b>	(0.7–1.5)	<b>1.1</b>	(0.6–2.0)
Male	<b>1.0</b>		<b>1.0</b>		<b>1.0</b>		<b>1.0</b>	
<b>Gender difference<sup>d</sup></b>	$\chi^2_1 = 6.6^*, P = 0.010$		$\chi^2_1 = 21.6^*, P < 0.001$		$\chi^2_1 = 0.0, P = 0.940$		$\chi^2_1 = 0.2, P = 0.650$	
<b>Employment status</b>								
Student	<b>0.6</b>	(0.3–1.5)	<b>0.9</b>	(0.5–1.5)	<b>0.6</b>	(0.2–1.8)	<b>0.5</b>	(0.1–1.9)
Homemaker	<b>1.1</b>	(0.6–2.0)	<b>0.8</b>	(0.6–1.2)	<b>1.0</b>	(0.5–2.1)	<b>1.9</b>	(0.6–6.3)
Retired	<b>0.3*</b>	(0.1–0.7)	<b>0.6</b>	(0.4–1.2)	<b>0.7</b>	(0.3–1.6)	<b>0.3</b>	(0.1–1.1)
Other	<b>1.8*</b>	(1.2–2.9)	<b>1.5*</b>	(1.1–1.9)	<b>1.0</b>	(0.6–1.6)	<b>2.3*</b>	(1.1–4.6)
Employed	<b>1.0</b>		<b>1.0</b>		<b>1.0</b>		<b>1.0</b>	

**Table 13.3 (cont.)**

Correlates	30-day IED <sup>a</sup>		Lifetime IED <sup>b</sup>		12-month IED among lifetime cases <sup>c</sup>		30-day IED among 12-month cases <sup>c</sup>	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
<b>Employment status difference<sup>d</sup></b>	$\chi^2_4 = 17.2^*, P = 0.002$		$\chi^2_4 = 12.5^*, P = 0.014$		$\chi^2_4 = 1.7, P = 0.783$		$\chi^2_4 = 12.4^*, P = 0.015$	
<b>Marital status</b>								
Never married	<b>0.6*</b>	(0.4–0.9)	<b>1.0</b>	(0.8–1.3)	<b>0.8</b>	(0.5–1.3)	<b>0.5*</b>	(0.3–0.9)
Divorced/separated/widowed	<b>1.4</b>	(0.9–2.2)	<b>1.3*</b>	(1.0–1.8)	<b>1.5</b>	(0.8–2.5)	<b>0.7</b>	(0.3–1.4)
Currently married	<b>1.0</b>		<b>1.0</b>		<b>1.0</b>		<b>1.0</b>	
<b>Marital status difference<sup>d</sup></b>	$\chi^2_2 = 9.6^*, P = 0.008$		$\chi^2_2 = 4.0, P = 0.132$		$\chi^2_2 = 3.9, P = 0.144$		$\chi^2_2 = 6.0, P = 0.050$	
<b>Education level</b>								
No education	–	–	–	–	–	–	–	–
Some primary	<b>2.5*</b>	(1.2–5.0)	<b>2.3*</b>	(1.6–3.3)	<b>1.3</b>	(0.5–3.6)	<b>1.5</b>	(0.3–8.6)
Finished primary	<b>1.3</b>	(0.6–3.0)	<b>1.7*</b>	(1.1–2.7)	<b>1.2</b>	(0.5–3.1)	<b>0.4</b>	(0.1–1.8)
Some secondary	<b>2.5*</b>	(1.4–4.4)	<b>2.3*</b>	(1.7–3.3)	<b>1.6</b>	(0.8–2.9)	<b>1.2</b>	(0.5–2.7)
Finished secondary	<b>1.5</b>	(0.8–2.8)	<b>1.7*</b>	(1.3–2.4)	<b>1.1</b>	(0.6–1.9)	<b>0.6</b>	(0.2–1.5)
Some college	<b>1.3</b>	(0.7–2.2)	<b>1.5*</b>	(1.1–2.1)	<b>0.9</b>	(0.5–1.6)	<b>0.7</b>	(0.3–1.6)
Finished college	<b>1.0</b>		<b>1.0</b>		<b>1.0</b>		<b>1.0</b>	
<b>Education level difference<sup>d</sup></b>	$\chi^2_6 = 14.6^*, P = 0.024$		$\chi^2_6 = 31.7^*, P < 0.001$		$\chi^2_6 = 8.5, P = 0.201$		$\chi^2_6 = 5.7, P = 0.459$	
<b>Household income</b>								
Low	<b>1.0</b>	(0.6–1.6)	<b>1.3</b>	(1.0–1.7)	<b>1.1</b>	(0.6–1.8)	<b>0.6</b>	(0.3–1.4)
Low-average	<b>0.9</b>	(0.5–1.4)	<b>1.0</b>	(0.7–1.3)	<b>1.2</b>	(0.6–2.3)	<b>0.7</b>	(0.3–1.7)
High-average	<b>0.5*</b>	(0.3–0.8)	<b>0.9</b>	(0.7–1.2)	<b>0.9</b>	(0.5–1.5)	<b>0.4*</b>	(0.2–0.9)
High	<b>1.0</b>		<b>1.0</b>		<b>1.0</b>		<b>1.0</b>	
<b>Household income difference<sup>d</sup></b>	$\chi^2_3 = 10.1^*, P = 0.018$		$\chi^2_3 = 9.5^*, P = 0.023$		$\chi^2_3 = 1.6, P = 0.649$		$\chi^2_3 = 5.4, P = 0.148$	
<b>N<sup>e</sup></b>	<b>88,063</b>		<b>3,731,811</b>		<b>674</b>		<b>357</b>	

\*Significant at the 0.05 level, two-sided test.

<sup>a</sup>These estimates are based on logistic regression models adjusted for age, gender and country.

<sup>b</sup>These estimates are based on survival models adjusted for age-cohorts, gender, person-years, and country.

<sup>c</sup>These estimates are based on logistic regression models adjusted for time since IED onset, age of IED onset, gender, and country.

<sup>d</sup>Chi-square test of significant differences between blocks of socio-demographic variables.

<sup>e</sup>Denominator N: 88,063 = total sample; 3,731,811 = number of person-years in the survival models; 674 = number of lifetime IED cases; 357 = number of 12-month IED cases.



**Table 13.4 Comorbidity of intermittent explosive disorder (IED) with other DSM-IV disorders, all countries combined**

	IED cases with comorbid disorders					
	Lifetime comorbidity <sup>a</sup>		12-month comorbidity <sup>b</sup>		Temporal priority of IED <sup>c</sup>	
	%	SE	%	SE	%	SE
<b>I. Mood disorders</b>						
Major depressive episode	35.2	2.5	25.2	2.9	68.1	3.2
Bipolar disorder	14.1	1.6	13.1	2.2	79.2	6.3
Any mood disorder	40.8	2.6	29.4	3.0	67.2	3.3
<b>II. Anxiety disorders</b>						
Panic disorder	9.5	1.2	8.3	1.5	54.9	5.9
Generalized anxiety disorder	20.8	2.1	19.1	2.8	62.6	5.6
Social phobia	23.1	1.9	18.8	2.5	28.1	4.4
Specific phobia	21.8	1.8	19.4	2.4	5.5	1.9
Agoraphobia	8.7	1.2	6.5	1.5	38.3	7.1
Post-traumatic stress disorder	15.5	1.5	11.0	1.7	54.9	5.8
Separation anxiety disorder	6.0	1.0	–	–	21.7	9.6
Adult separation anxiety disorder	15.6	1.6	4.9	1.4	74.3	4.7
Any anxiety disorder	58.5	2.4	49.4	3.2	26.7	3.0
<b>III. Disruptive behaviour/impulse-control disorders</b>						
Attention deficit disorder	12.0	1.9	11.2	2.3	14.1	5.0
Conduct disorder	16.6	2.1	3.4	1.2	44.9	6.3
Oppositional defiant disorder	16.5	1.9	4.3	1.3	24.5	5.5
Binge-eating disorder with hierarchy	2.5	0.7	1.0	0.5	50.3	13.6
Bulimia with hierarchy	1.7	0.6	1.2	0.7	49.5	16.9
Any impulse-control disorder	30.9	2.5	16.6	2.6	27.1	4.6
<b>IV. Substance-use disorders</b>						
Alcohol abuse	36.5	2.3	17.2	2.4	78.3	3.3
Alcohol dependence	17.2	2.0	10.0	2.1	92.4	2.7
Drug abuse	15.7	1.8	5.5	1.5	72.9	5.4
Drug dependence	8.0	1.2	3.1	1.1	94.3	4.2
Any substance-use disorder	39.6	2.4	20.6	2.8	74.0	3.5
<b>V. Any mental disorder</b>	<b>81.7</b>	<b>2.2</b>	<b>68.2</b>	<b>3.5</b>	<b>28.8</b>	<b>2.5</b>

<sup>a</sup>Percentage of respondents with lifetime IED who also meet lifetime criteria for at least one of the other DSM-IV disorders.

<sup>b</sup>Percentage of respondents with 12-month IED who also meet 12-month criteria for at least one of the other disorders.

<sup>c</sup>Percentage of respondents with either lifetime IED and at least one of the other disorders, whose age-of-onset of IED is reported to be younger than the age-of-onset of all comorbid disorders under consideration.

related to country income level is consistent with the pattern we see for most of the mental disorders and this pattern is discussed further in Chapter 22.

We found that lifetime prevalence of IED was higher among males, the young, the unemployed, and those with lower educational attainment, consistent with prior clinical and community studies (Coccaro *et al.* 2005; Kessler *et al.* 2006; Ortega *et al.* 2008; Kessler *et al.* 2012). Marital separation/divorce was also weakly associated with increased likelihood of lifetime IED and although the direction of that association is unclear, other WMH data suggests that IED is associated with increased likelihood of divorce, although not once comorbid disorders are taken into account (Breslau *et al.* 2011). Relative to being married, being never married was associated with decreased episode persistence and thereby also with decreased

current burden of IED. These varied associations with marital status, together with the reported greater functional impairment in the social domains, suggest that turbulent intimate relationships both contribute to and are consequences of IED.

Within countries, we saw the expected associations between lower socio-economic status (household income and education) and higher likelihood of having IED at all. But we also found that current prevalence of IED at time of interview was higher among those in the highest household income category relative to the second-to-highest household income category. This latter finding will take some further research to understand but it may reflect either the stresses associated with higher occupational status, or that aggressive traits increase the likelihood of higher income as some research has suggested (Judge *et al.* 2012).

**Table 13.5 Associations (odds ratios) between lifetime traumatic events and the subsequent onset of DSM-IV intermittent explosive disorder<sup>a</sup>**

Type of lifetime traumatic event	Bivariate model <sup>b</sup>		Multivariate type model <sup>c</sup>		Multivariate number model <sup>d</sup>	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
<b>I. War events</b>						
Combat experience	<b>0.5</b>	(0.2–1.3)	<b>0.3*</b>	(0.1–0.7)	–	–
Other war experience	<b>2.3*</b>	(1.4–3.6)	<b>1.8*</b>	(1.1–2.8)	–	–
<b>II. Other interpersonal violence</b>						
Physically abused as a child	<b>3.6*</b>	(2.8–4.8)	<b>2.2*</b>	(1.6–3.1)	–	–
Physically assaulted or threatened	<b>1.6*</b>	(1.1–2.4)	<b>1.0</b>	(0.6–1.6)	–	–
<b>III. Intimate or sexual violence</b>						
Physically abused or threatened by spouse or romantic partner	<b>3.1*</b>	(2.1–4.6)	<b>1.7*</b>	(1.0–2.8)	–	–
Sexually assaulted	<b>2.9*</b>	(2.1–4.2)	<b>1.6*</b>	(1.0–2.4)	–	–
<b>IV. Accident</b>						
Automobile accident	<b>1.1</b>	(0.7–1.8)	<b>0.8</b>	(0.5–1.3)	–	–
Other life-threatening accident	<b>1.4</b>	(1.0–2.1)	<b>0.9</b>	(0.6–1.5)	–	–
Natural disaster	<b>1.2</b>	(0.8–1.9)	<b>0.8</b>	(0.5–1.3)	–	–
Life-threatening illness	<b>2.0*</b>	(1.2–3.3)	<b>1.5</b>	(0.9–2.6)	–	–
<b>V. Death</b>						
Unexpected death of a loved one	<b>1.7*</b>	(1.2–2.4)	<b>1.3</b>	(0.9–1.8)	–	–
<b>VI. Network events</b>						
Other LTE to a loved one	<b>1.5</b>	(0.8–2.5)	<b>0.8</b>	(0.5–1.5)	–	–
Witnessed a traumatic injury or death	<b>1.8*</b>	(1.2–2.7)	<b>1.3</b>	(0.8–2.0)	–	–
Witnessed family violence as a child	<b>3.5*</b>	(2.8–4.4)	<b>2.3*</b>	(1.8–3.0)	–	–
<b>VII. Other</b>						
Other events	<b>2.4*</b>	(1.6–3.7)	<b>1.5*</b>	(1.0–2.4)	–	–
<b>Joint significance of all types of traumatic events</b> $\chi^2_{15}$ [P-value]	–	–	$\chi^2_{15} = 339.2^*, P < 0.001$		–	–
<b>VIII. Number of traumatic events</b>						
Exactly one type	–	–	–	–	<b>3.1*</b>	(2.4–4.0)
Exactly two types	–	–	–	–	<b>4.5*</b>	(3.1–6.5)
Exactly three types	–	–	–	–	<b>5.6*</b>	(3.7–8.7)
Four or more types	–	–	–	–	<b>8.0*</b>	(5.3–11.9)
<b>Joint significance of all numbers of traumatic events</b> $\chi^2_4$ [P-value]	–	–	–	–	$\chi^2_4 = 130.4^*, P < 0.001$	

\*Significant at the 0.05 level, two-sided test.

<sup>a</sup>Analysis for this table was performed on 14 out of 17 surveys due to restriction of data on lifetime traumatic events, and on the Part 2 subsamples in those surveys ( $n = 33,970$ ).

<sup>b</sup>Bivariate models: each trauma type was estimated as a predictor of IED onset in a separate discrete-time survival model controlling for age-cohorts, gender, person-year, education, marriage, employment status, and country.

<sup>c</sup>Model was estimated with dummy variables for all trauma types entered simultaneously as predictors of IED onset, including the controls specified in (b).

<sup>d</sup>Model was estimated with dummy variables for number of traumas (without any information about type of trauma) as predictors of IED onset including the controls specified in (b).

We found IED to have a median age-of-onset of 17, which is in the mid-range of estimates from prior studies (Coccaro 2012). This estimate makes it one of the earlier onset disorders included in this volume. Also consistent with prior studies is the finding of a high degree of comorbidity with other mental disorders (Coccaro *et al.* 2005; Kessler *et al.* 2006) and in particular the high comorbidity with substance-use,

anxiety, and mood disorders. Chapter 20 provides further indication that the comorbidity patterns of IED do not place it exclusively in the category of externalizing disorders, compared with other typical externalizing disorders (e.g., substance-use disorders or conduct disorder).

From the information respondents provided on the type and frequency of anger attacks during the

week of their most violent attack it appears that many anger attacks are non-destructive, although individuals engaging in these less destructive attacks might also have engaged in the more destructive attacks. Anger attacks that cause harm to others are also common, with 43% per cent of those meeting 12-month criteria for IED reporting that they had hurt someone badly during their most violent anger attack. Moreover, a small proportion reported purposely torturing or injuring an animal, or arson. Our data do not allow us to determine whether some of these acts might have been premeditated rather than reactive. A recent study of a predominantly clinical population found that 5.9% of those meeting criteria for DSM-5 IED were also classified as 'highly likely' to meet criteria for psychopathic personality (Coccaro *et al.* 2014a).

Although the WMH findings suggest that a substantial minority of individuals with IED (39%) are significantly disabled by their disorder, especially in terms of social and relationship functioning, the majority only reported mild-moderate impairment. This finding conflicts with a recent study that found participants meeting DSM-5 criteria for IED reported much greater impairment across all domains (occupational, social, legal) compared with participants meeting criteria for other mental disorders (Kulper *et al.* 2015). However, the IED group in that study was a self-selected sample that were characterized by substantially higher levels of lifetime mental disorder comorbidity than the mental disorder control group; this suggests that the IED group were more clinically severe. The WMH data on impairment are important because they are more representative of IED in the general population. In this respect we note that the 38.9% with severe impairment places IED in the bottom third of disorders ranked by proportion with severe impairment (see Chapter 22). This may be because some individuals with IED may not be fully aware of, or may partly deny, the full ramifications of their aggressive outbursts either for themselves or for those on the receiving end of the outbursts. The sporadic/intermittent nature of the aggressive outbursts may also be a factor that reduces associated impairment.

Our results indicate that a wide range of traumatic events are associated with risk of IED, but after controlling for the clustering of traumatic events in peoples' lives it is the experience (direct or witnessing) of physical violence in childhood that most strongly predicts IED onset. One other recent study

that considered multiple forms of child maltreatment found that only physical abuse was independently associated with IED (Fanning *et al.* 2014). Finding an association between physical abuse in childhood and IED in adolescence and adulthood is not surprising given the large amount of research on the inter-generational transmission of violence mediated by a range of neurobiological, emotional, cognitive, and behavioural mechanisms (Van Goozen *et al.* 2007). It is interesting, though, that we found witnessing of family violence to be associated with IED onset even after controlling for the direct experience of violence. Prior research has found that the witnessing of family violence is generally a less potent risk factor compared to direct experience of physical abuse but that it is nonetheless a reliable and independent predictor risk factor for youth involvement in violence (Yexley *et al.* 2002). We also found that prior experiences of intimate partner violence and sexual assault were independently associated with IED onset. Other studies have found IED to be associated with reports of intimate partner violence (O'Leary *et al.* 2008; Murray-Close *et al.* 2010) and although it is not surprising that IED would increase risk of perpetration of intimate partner violence, our time-lagged analyses suggest that experience of intimate partner violence may be a risk factor for the onset of IED. Prospective studies will be required to confirm this direction of association but it underscores the comment made earlier that relationship difficulties may precede as well as follow IED. Finally, the experience of non-combat violence emerged as a risk factor for IED onset, but by contrast, combat experience was protective. This latter finding may reflect military selection procedures or aspects of military training.

In summary, IED prevalence varies substantially across countries with an average of 0.8% in this group of 16 countries, and shows a positive gradient of increasing prevalence with increasing country income level. IED is more common in males, the young and the socially disadvantaged. It is one of the earlier onset disorders and is highly comorbid with a wide range of other disorders. Traumatic lifetime experiences involving violence, especially those occurring early in life, are predictively associated with lifetime odds of IED. A substantial minority of those with IED report significant functional impairment but this likely underestimates the true societal costs of IED in terms of the effects of explosive anger attacks on families and relationships.

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