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The experience of aggressive outbursts in Intermittent Explosive Disorder



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ABSTRACT

Conceptualizations of Intermittent Explosive Disorder (IED) have suffered from a scarcity of research investigating the subjective experience and phenomenology of the aggressive outbursts among those with IED relative to those who partake in more normative forms of aggression. Furthermore, though some studies have shown that individuals with IED are more impaired and have a poorer quality of life, few studies looked at negative outcomes specific to an individual with IED's aggressive behavior. The purpose of this study was to examine the subjective experience and social, occupational, and legal consequences of aggressive outbursts in IED. We assessed individuals with IED ($n=410$), psychiatric controls ($n=133$), and healthy controls (HC) ($n=154$) in the experiential correlates present before, during, and after an aggressive outburst as well as the consequences of aggressive outbursts. Results indicated that before and during aggressive outbursts, individuals with IED experienced more intense anger, physiological reactivity, and feelings of dyscontrol as well as more remorse after an aggressive outburst. Furthermore, individuals with IED report more negative consequences of their aggressive outbursts. These results provide an account of how the subjective experience and consequences of aggressive outbursts in IED differ from those with more normative forms of aggression.

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1. Introduction

Aggression, defined as behavior directed toward an individual with the intent to harm (Geen and Donnerstein, 1998) is a common occurrence, with over 80% of individuals engaging in some form of aggression in their lifetime (Newton et al., 2001). Homicide, aggression's most extreme point, is the second leading cause of death among individuals aged 15–24 (Xu et al., 2010) and lesser acts of violence are even more ubiquitous (Barratt et al., 1999). Thus, aggression is both ever-present and dangerous. Moreover, billions of dollars in productivity are lost yearly due to aggression and its consequences, so much so that the World Health Organization (2002) has identified aggression as a major public health concern. Despite this, the phenomenology and consequences of aggression are not well understood.

Aggression can vary in both form and function. With respect to form, aggression can be verbal (e.g., yelling, heated arguments) or physical (e.g., assaults against people or property), with the verbal more common and the physical typically more severe in its

consequences (Baron and Neuman, 1996). The function of aggression can also vary as aggressive acts can be predominately instrumental, in which aggression is a tool to achieve a goal not directly connected to anger (e.g., knocking someone down to rob them) or affective (i.e., reactive) where aggression is used express anger and/or retaliate (Anderson and Bushman, 2002). Though some have argued that a strict dichotomy based on these functions is not valid as most acts of aggression have both instrumental and affective aspects (Feshbach, 1964), research suggests the large majority of aggressive acts or predominately affective (Anderson et al., 1995; Bushman and Anderson, 2001). As such, aggression is linked to the activation of the sympathetic nervous system, often producing the subjective experiences indicative of a “fight or flight” response such as racing heart, trembling, fear and/or rage, and feeling out of control (Böddeker and Stemmler, 2000). These emotional and physiological responses may be enhanced among more aggressive individuals, such as those with an aggressive disorder.

Though several psychiatric disorders include aggression as a criterion, Intermittent Explosive Disorder (IED) is the sole psychological disorder defined by recurrent acts of affective aggression (DSM-5; American Psychiatric Association, 2013). Research on IED demonstrates that the frequency of the aggressive outbursts among individuals with IED is much higher than the general population with these individuals

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engaging in, on average, approximately 65–70 acts of assault and/or property destruction, causing over \$1000 in damage and leading to multiple hospitalizations in their lifetime (Coccaro, 2003; Kessler et al., 2006, 2011). Although the frequency of aggressive acts clearly differentiates individuals with and without IED, no study has assessed the extent to which the physiological and emotional experiences associated with an aggressive outburst differ among those with IED relative to other less aggressive clinical and non-clinical populations.

Aggression can be harmful to the aggressor as well as the victim. Highly aggressive individuals tend to experience interpersonal difficulties such as damaged friendships (Deffenbacher et al., 1996), workplace difficulties (Bedi et al., 2013) and negative health consequences such as high blood pressure, heart disease, and stroke (McCloskey et al., 2010). Individuals with IED are more likely to engage in aggression in romantic relationships (O'Leary et al., 2014), develop ulcers (Scott et al., 2013) and other more serious health problems (McCloskey et al., 2010), and show greater overall functional impairment relative to other psychiatric and non-psychiatric comparison groups (McCloskey et al., 2006). However individual with IED also tend to have global problems with emotion regulation (McCloskey et al., 2008a) and no published studies to date have examined the extent to which impaired psychosocial functioning (e.g., family problems, relationship problems, legal problems) in IED is specifically related to their aggressive behavior.

To address these gaps in the literature, the current study investigated the phenomenology of aggressive outbursts in individuals with IED, as compared to individuals with other psychiatric disorders and healthy volunteers. Specifically, we looked at (1) subjective emotional and physical reactions before, during, and after an aggressive outburst and (2) the reported interpersonal and occupational consequences of aggressive outbursts. We hypothesized that individuals with IED will report higher levels of negative emotions, physical symptoms, and feelings of dyscontrol before and during the aggressive outburst, as well as more negative emotionality following the aggressive outburst than participants in the control groups. We also predicted that aggressive outbursts in IED will be associated with more negative interpersonal, occupational, and legal consequences than in the comparison groups.

2. Method

2.1. Participants

Participants were 697 adults (53.7% female) recruited through public service announcements and advertisements for healthy volunteers and individuals with emotional/anger problems through the Clinical Neuroscience and Psychopharmacology Research Unit (CNPRU) at the University of Chicago. The participants completing the study ranged in age from 18 to 65 years ($M = 34.47$, $S.D. = 9.82$) and were predominately Caucasian (52%) or African-American (34%) and relatively well-educated (86% had at least some college education).

Informed consent was obtained for all participants. Participants were excluded from all CNPRU studies if they reported (a) current drug or alcohol dependence, (b) current (past month) psychopharmacotherapy, (c) a history of bipolar or psychotic disorder, or (d) a traumatic head injury with a loss of consciousness greater than 60 min. For this study, participants were divided into the following three diagnostic groups based on their responses to a clinical interview

Healthy controls (HC) had no history of psychiatric disorders ($n = 154$).

Psychopathology Controls (PC) had a history of psychiatric disorders without any lifetime IED ($n = 133$). See Table 2 for a breakdown of the diagnoses.

Intermittent Explosive Disorder (IED) met DSM-5 IED criteria (American Psychiatric Association, 2013).

2.2. Measures

2.2.1. Structured clinical interview for the DSM-IV (SCID; First et al., 1996)

The SCID was used to diagnose DSM-IV non-IED Axis-I disorders. The SCID is a semi-structured clinical interview used to assign diagnoses for mood disorders, schizophrenia and other psychotic disorders, alcohol and other substance abuse and dependence, anxiety disorders, somatoform disorders, eating disorders, and adjustment disorders. The SCID has adequate inter-rater reliability with kappa values for modules reported to be between 0.70 and 1.00 (First et al., 1996).

2.2.2. Structured interview for DSM-IV personality (SIDP-IV; Pfohl et al., 1995)

The SIDP-IV was employed to assess personality disorders (i.e., DSM-IV Axis II disorders). Estimates of inter-rater reliability for the SIDP-IV are reported to be adequate (Pfohl et al., 1995).

2.2.3. Intermittent explosive disorder interview (IED-I; Coccaro, unpublished instrument)

The IED-I, a structured clinical interview used to assess and diagnose DSM-5 IED, was the primary outcome measure. The IED-I obtains quantitative (e.g., frequency) and qualitative (e.g., description of most severe events) data for verbal aggression, aggression against property, and aggression against others, as well as the level of distress and negative consequences resulting from these behaviors. The IED-I also contains questions aimed at assessing the qualitative experience of aggression including the presence/absence of several emotions (e.g., feeling angry, enraged, detached/unreal) or physical symptoms (e.g., racing heart, shortness of breath, tingling sensations) before, during, or after a typical aggressive outburst. Preliminary data show the IED-I to have good predictive validity and inter-rater reliability (Coccaro and McCloskey, 2004).

2.3. Procedure

All participants completed an hour long diagnostic interview conducted by trained graduate-level diagnosticians who were not informed about the study hypotheses. All diagnosticians were graduate students in clinical psychology that had in-depth training in the interviews. All interviews were video recorded and a licensed clinical psychologist or psychiatrist supervised all interviews. IED diagnoses were made using the IED-I. Personality disorders were assessed using the SIDP-IV. Non-IED Axis-I diagnoses were assigned using the SCID. All diagnosticians went through a rigorous training program that included lectures on DSM diagnoses and rating systems, videos of expert raters conducting IED-I/SCID/SIDP-IV interviews, and practice interviews and ratings until the raters were deemed reliable by the trainer. This process resulted in good to excellent inter-rater reliabilities (mean kappa of 0.84 $S.D. = 0.05$; range: 0.79–0.93) across psychiatric disorders. Final diagnoses were assigned by team best-estimate consensus procedures (Leckman et al., 1982) in which the diagnostic report was reviewed and agreed upon by a committee of research psychiatrists and clinical psychologists. This methodology has previously been shown to enhance the accuracy of diagnosis over direct interview alone (Kosten and Rounsaville, 1992).

2.4. Data analysis

We conducted preliminary analyses using ANOVAs, *t*-tests, and chi-square tests to compare the three diagnostic groups on the demographic variables and prevalence of psychopathology. Any

demographic or psychopathology variable that differed between groups was included as a covariate in the initial primary analyses and included if their presence had an impact on the interpretation of the results. Otherwise we reported the results without the demographic or psychopathology covariates. We also conducted preliminary analyses on the frequency of verbal aggression, property destruction, and physical aggression.

Primary analyses examined the effect of group on the emotional and physiological reactions before/during and after an aggressive outburst, and the consequences of aggressive outbursts. Data characterizing the experiential correlates of an aggressive outburst as well as the consequences of aggressive outbursts were analyzed using omnibus chi-square tests to determine whether group differences exist. Significant omnibus results were followed up by single degree of freedom chi-square analyses. Due to the resulting number of tests performed, these analyses were conducted at the 0.01 level of significance. These analyses were also run as logistic regressions to test the possible effects of gender on the relationship between group and the primary outcome variables. However, in all cases including a gender covariate did not change the overall pattern of results. As such, gender was not included as a covariate in the final analyses and chi-square tests were used.

3. Results

3.1. Preliminary analyses

3.1.1. Demographic variables

Analyses of demographic (i.e., age, race, education, gender) variables are displayed in Table 1. In the table, all groups with different subscripts across rows are significantly different. Results showed no group differences with regard to gender. There was a significant difference in age between groups such that IED and PC participants were significantly older than HC participants. There were significant group differences in regard to race such that there was a higher proportion of non-white participants in the IED group than the PC and HC groups. Finally, there were significant group differences in level of education such that IED participants were significantly less educated than the PC and HC groups. Due to these group differences, all analyses were rerun using logistic regression with race, age, and education at the time of rating as covariates. In all cases, including these covariates did not affect the pattern of results, and thus were not included in the final analyses.

Table 1
Demographic variables as a function of diagnostic group.

Variable	IED	PC	HC	Total	χ^2/F
Age (S.D.)	35.79 _a (9.94)	34.05 _a (9.40)	31.26 _b (9.13)	34.46 (9.82)	12.50***
Gender (%)					1.94
Male	191 (46.6)	67 (50.4)	66 (42.6)	324 (46.4)	
Female	219 (53.4)	66 (49.6)	89 (57.4)	374 (53.6)	
Education (%)					17.64***
College	333 _a (81.2)	121 _b (91.0)	145 _b (93.5)	599 (85.8)	
No college	77 (18.8)	12 (9.0)	10 (6.5)	99 (14.2)	
Race (%)					9.16**
Caucasian	186 _a (45.4)	77 _b (57.9)	87 _b (56.1)	350 (50.1)	
AA/other	224 (54.6)	56 (42.1)	68 (43.9)	348 (49.9)	

Note: Groups with different subscripts across rows are significantly different. IED: Intermittent Explosive Disorder, PC: Psychopathology Controls, HC: Healthy Controls.

* $p < 0.05$.

*** $p < 0.001$.

** $p < 0.01$.

3.1.2. Psychopathology

Table 2 shows the differences in psychopathology across IED and PC groups. Participants in the IED group had significantly more major lifetime non-personality (i.e., formerly DSM-IV Axis I) disorders ($M = 1.81$, $S.D. = 1.56$, $t(541) = 22.90$, $p < 0.001$) than participants in the PC group ($M = 1.12$, $S.D. = 1.07$). Similarly, participants in the IED group also had more personality disorders ($M = 1.56$, $S.D. = 1.12$, $t(541) = 18.41$, $p < 0.001$) than individuals in the PC group ($M = 0.75$, $S.D. = 0.80$). Results revealed that participants in the IED group had significantly higher instances of mood disorders, substance dependence disorders, anxiety disorders, childhood disorders, and Cluster A and B personality disorders (see Table 2). These findings are consistent with previous research on IED indicating that individuals with IED often have a number of other co-morbid diagnoses. Inclusion of the psychopathology covariates did not have an effect on the interpretation of results for any of the primary analyses with one exception – the difference in the percentage of IED and PC participants endorsing anger before a typical outburst went from significant to a non-significant trend ($p = 0.052$). Thus we report this finding as a non-significant trend. Otherwise we excluded the psychopathology covariates from the final analyses.

3.1.3. Frequency of aggressive acts

Due to significant outliers and skew for the aggression frequency data, all values more than three standard deviations from the mean were winsorized to the value that is equal to three standard deviations from the mean (Tabachnick and Fidell, 1996). Variables were then log transformed. This resulted in variables that were

Table 2
Number of participants endorsing lifetime psychopathology.

Type of disorder	IED (%)	PC (%)	χ^2
Mood disorder	267 (65.1)	58 (43.6)	19.34***
Anxiety disorder	183 (44.6)	30 (22.6)	20.53***
Alcohol dependence	85 (20.8)	29 (21.8)	0.63
Drug dependence	103 (25.1)	14 (10.5)	12.66***
Childhood disorder	207 (50.5)	12 (9.0)	71.75***
Personality disorders			
Cluster A	68 (16.6)	5 (3.8)	14.20***
Cluster B	214 (52.1)	27 (20.3)	41.39***
Cluster C	109 (26.6)	28 (21.1)	1.63

IED: Intermittent Explosive Disorder, PC: Psychopathology Controls, HC: Healthy Controls

*** $p \leq 0.001$.

** $p \leq 0.01$.

normalized to modestly skewed (skew statistic=0.13–2.26). To improve interpretability of the findings, means and standard deviations of frequency presented in the text and tables represent the non-log-transformed data.

Aggressive acts per year [total # of acts in adulthood/(age-18)] were separated into three categories – verbal aggression (including both verbal arguments and temper tantrums), physical aggression against property, and physical aggression against others. A 3 (group) × 2 (gender) MANOVA revealed significant multivariate group effect (Wilks' $F(6, 1380) = 160.94, p < 0.001, \eta_p^2 = 0.41$). Univariate analyses revealed that there were significant group differences for verbal aggression, aggression against property, and physical aggression against others (see Table 3 for complete results). There was no multivariate effect of gender (Wilks' $F(3, 690) = 1.40, p = 0.24, \eta_p^2 = 0.01$), or group by gender interaction (Wilks' $F(6, 1380) = 1.74, p = 0.11, \eta_p^2 < 0.01$) on aggression frequency.

3.2. Primary analyses

3.2.1. Experiential correlates of aggression

Omnibus chi-square analyses showed significant differences in the frequency with which subjects experienced all emotions and sensations (other than being calm, sexually aroused, or short of breath) immediately before or during an aggressive outburst (see Table 4 for full results). When assessing specific emotions, participants with IED reported feeling significantly more enraged than both the PC and HC groups. IED participants also reported feeling significantly more irritated, less clear-headed, more detached/unreal, and more afraid/panicked than the HC group. Participants in the PC group reported feeling significantly more enraged and fearful/panicked than participants in the HC group. No other group differences for prevalence of emotions before/during an outburst were significant (all $p > 0.01$).

When assessing physical sensations before or during an outburst, individuals with IED experienced more hot flashes than those in the PC group. IED participants experienced hot flashes, racing heart, sweating, and trembling more often than HC participants. Additionally, participants in the PC group reported more trembling than participants in the HC group. No other group differences for prevalence of physical sensations before/during an outburst were significant (all $p > 0.01$).

When assessing feelings of dyscontrol before or during a typical aggressive outburst, individuals in the IED group reported feeling out of control, like screaming, like hitting, like they exploded in anger, and like they had a “hair trigger” more than participants in the PC group. Additionally, participants in the IED group also reported feeling out of control, like screaming, like hitting, like they exploded in anger, and like they had a “hair trigger” more than participants in the HC group. Participants in the PC group reported feeling significantly more like hitting during a typical aggressive outburst than participants in the HC group.

When assessing emotional experiences after an outburst, omnibus chi-square analyses showed group differences for the proportion

Table 3
Frequency of aggressive acts (mean acts / year) as a function of diagnostic group.

Type of aggression	IED (S.D.)	PC (S.D.)	HC (S.D.)	F	η^2
Verbal	112.89 _a (128.29)	3.49 _b (8.88)	0.89 _c (4.60)	636.23	0.65***
Property	6.14 _a (15.85)	0.06 _b (0.25)	0.01 _b (0.05)	90.20	0.21***
Others	6.79 _a (20.06)	0.08 _b (0.20)	0.02 _b (0.07)	92.78	0.21***

Note. Groups with different subscripts across rows are significantly different. Degrees of freedom for ANOVA=2, 692. IED: Intermittent Explosive Disorder, PC: Psychopathology Controls, HC: Healthy Controls.

*** $p < 0.001$.

Table 4
Percent of participants endorsing emotions and sensations before / during a typical outburst as a function of diagnostic group.

	IED	PC	HC	χ^2
Emotions				
Angry	98 _a	92 _a	88 _b	15.80***
Irritated	96 _a	90 _a	84 _b	14.64***
Enraged	83 _a	51 _b	23 _c	107.71***
Calm	8 _a	16 _a	11 _a	4.92
Clear headed	28 _a	34 _a	51 _b	12.89**
Detached/unreal	38 _a	27 _a	12 _b	17.02***
Fear/panic	38 _a	40 _a	14 _b	13.10**
Sensations				
Sexually aroused	4 _a	2 _a	5 _a	0.77
Racing heart	74 _a	70 _a	53 _b	16.65***
Hot flashes	35 _a	20 _b	12 _b	17.60***
Sweating	39 _a	33 _a	16 _b	11.45**
Short of breath	32 _a	26 _a	18 _a	5.72
Trembling	53 _a	46 _a	19 _b	22.71***
Feelings of dyscontrol				
Out of control	75 _a	35 _b	16 _b	105.48***
Felt Like screaming	88 _a	73 _b	63 _b	26.91***
Felt like hitting	79 _a	48 _b	18 _c	100.60***
Explode in anger	21 _a	7 _b	5 _b	14.76***
Hair trigger	17 _a	5 _b	0 _b	18.94***

Note. Groups with different subscripts across rows are significantly different. IED: Intermittent Explosive Disorder, PC: Psychopathology Controls, HC: Healthy Controls.

* $p < 0.05$.

*** $p < 0.001$.

** $p < 0.01$.

Table 5
Percent of participants endorsing emotions after a typical outburst as a function of diagnostic group.

Emotion	IED	PC	HC	χ^2
Remorseful	76 _a	62 _b	61 _b	9.74**
Relieved	60 _a	57 _a	56 _a	0.36
Disappointed	75 _a	62 _b	46 _b	23.47***
Embarrassed	65 _a	51 _b	33 _b	24.10***
Pleasure	25 _a	18 _a	5 _b	12.12**

Note. Groups with different subscripts across rows are significantly different. IED: Intermittent Explosive Disorder, PC: Psychopathology Controls, HC: Healthy Controls.

* $p < 0.05$.

*** $p < 0.001$.

** $p < 0.01$.

of participants endorsing disappointed, embarrassed, and pleasurable (but not remorseful or relieved) feelings (see Table 5). IED participants were more likely to endorse disappointment, embarrassment, and pleasure after an aggressive outburst than participants in the HC group, and more likely to endorse remorse, disappointment, and embarrassment than the PC group.

3.2.2. Consequences of aggressive outbursts.

Analyses of the frequency of responses showed that a higher proportion of individuals with IED reported adverse consequences of their aggressive outbursts across all eight domains (e.g., occupational, interpersonal, legal) relative to PC and HC participants (see Table 6 for full results). The PC group was also more likely to report adverse consequences in the friends and legal domains as a result of their aggression than HC participants.

Table 6
Percent of participants endorsing consequences of aggressive outbursts as a function of diagnostic group.

Consequence	IED	PC	HC	χ^2
Occupational	56 _a	16 _b	4 _b	98.37***
Family	82 _a	23 _b	13 _b	203.48***
Friends	75 _a	24 _b	6 _c	168.10***
Legal	39 _a	11 _b	0 _c	60.99***
Upset	90 _a	51 _b	32 _b	148.60***
Sought counseling	74 _a	11 _b	3 _b	187.24***

Note. Groups with different subscripts across rows are significantly different. IED: Intermittent Explosive Disorder, PC: Psychopathology Controls, HC: Healthy Controls.

** $p < 0.01$.

* $p < 0.05$.

*** $p < 0.001$.

4. Discussion

In the present study we examined (1) experiential correlates of anger outbursts and (2) consequences of aggressive behavior in IED relative to psychiatric and non-psychiatric control groups. Our results indicated that relative to healthy controls, individuals with IED were more likely to experience negative emotions (e.g., feeling angry, irritated), aversive physical sensations (e.g., racing heart, sweating), and feelings of dyscontrol (e.g., feeling like screaming, hitting, exploding) before/during an anger outburst. Thus, these results were generally in line with our hypotheses. The only exceptions were the lack of differences between IED and healthy controls on feeling calm and being sexually aroused, which were infrequently endorsed across all three groups. In contrast to the global pattern of increased endorsement of emotional and physiological arousal in IED relative to healthy controls, differences between IED and psychiatric controls were more circumscribed, limited to feelings of being enraged and sensations of hot flashes. However, when assessed for feelings of dyscontrol, individuals with IED differed from psychiatric controls on all indices just as they differed from healthy controls. Taken together, this suggests that IED and healthy controls differ with respect to both the emotional and physiological experience surrounding an anger outburst; whereas the experience of outbursts in IED and non-IED psychiatric controls are more similar, with feelings of dyscontrol the primary experiential difference between the two groups.

The lack of significant difference between psychiatric controls and individuals with IED on some of the sensations during an outburst (e.g., trembling, feeling short of breath) may be understood within the context of methodology used in these studies. Individuals with higher trait anger (such as those with IED) tend to become more physiologically aroused during a provocation (Harburg et al., 1991). In these studies, however, physiological arousal is measured objectively (e.g., heart rate) and this may not be indicative of what an individual subjectively experiences. Individuals with IED may habituate to these physical sensations because they have them so often, leading them to be less aware of such sensations during a “typical” outburst. This is consistent with laboratory studies that find people high in trait aggression tend to habituate towards anger-related cues with repeated exposure (Cohen et al., 1998).

A second explanation for the similarities between IED and psychiatric controls may have to do with the high rate of comorbidity in the IED group. The comorbid psychiatric diagnoses might contribute to the features found in both IED and psychiatric controls. For example, feelings of panic are common among anxious individuals. The similarities between the two groups on feelings of panic during an anger outburst might be due to comorbid anxiety. This suggests that there is some merit in addressing underlying

comorbidity in IED in a clinical setting as this might help reduce some of the intensity of negative reactions in outbursts.

A final explanation for the unexpected similarities between IED and psychiatric controls on subjective sensations is that the pattern of comparable endorsement of self-reported affective and physiological symptoms between IED and PC groups reflects a non-specific vulnerability to psychopathology in general, such as emotion dysregulation. Emotion dysregulation deficits are present in both IED and other forms of psychopathology (Gross, 1998). Thus, emotion dysregulation differentiates some aspects of the experience of an aggressive outburst (e.g., fear, trembling, feeling out of control) between individuals with and without psychopathology, while other factors differentiate other aspects of an aggressive outbursts between individuals with IED and those with other psychopathology. For example, individuals with IED have higher levels of trait anger and hostility (McCloskey et al., 2006). Furthermore, individuals with IED have more severe anger lability than individuals with other psychological disorders (McCloskey et al., 2008a) and show corticolimbic dysregulation relative to healthy volunteers when processing angry faces (e.g., Coccaro et al., 1998). This increased trait anger and anger lability may result in the dyscontrol that differentiates individuals with IED from other clinical populations during an aggressive outburst.

Regardless of explanation, what seems to best discriminate aggressive outbursts in IED from those in other clinical populations is the feeling of dyscontrol. Thus even if individuals with IED endorse the same affective and physiological symptoms, these symptoms appear to be more likely experienced as overwhelming. This is consistent with data showing individuals with IED report greater dysregulation of anger than other psychiatric groups (McCloskey et al., 2008a).

With respect to emotions experienced following an anger outburst, participants with IED were more likely to report their outbursts as resulting in this feeling distressed (i.e. embarrassed, disappointed and remorseful) than participants in either the HC or PC groups. This could reflect an attentional bias to these anger outbursts and/or a tendency to catastrophize and be self-critical. Individuals with IED often engage in these types of cognitive biases and treatment for IED for on distortions such as catastrophizing and “shoulds” (McCloskey et al., 2008b). However, it is just as likely that these emotions reflect the likelihood that the anger outbursts among individuals with IED lead to more significant negative consequences. This was supported by our data on consequences of aggressive outbursts.

We found that aggressive outbursts in IED were associated with greater impairment/more negative consequences across all domains assessed. Individuals with IED were more likely to report problems in occupation, social (with family and friends), and legal domains. Relatedly, individuals with IED reported being more upset about their aggressive outbursts and were more likely to seek counseling for their aggression. These findings are in line with previous studies that find that individuals with IED exhibit greater overall impairment and poorer quality of life (McCloskey et al., 2006, 2008a). These findings are not surprising given the harmful nature of aggression. When aggression occurs at the frequency and severity that it does in individuals with IED, it has lasting effects in all types of interpersonal and occupational contexts. Supporting this, the results show global impairment in every domain – interpersonally, occupationally, and legally. As such, these damaged relationships and occupational/legal difficulties cause stress in one's life leading to greater impairment.

Overall, the results indicated that aggressive outbursts are experienced differently among individuals with IED. Aggressive outbursts among individuals with IED are more intense, somewhat more arousing, more troubling, and are associated with a greater subjective experience of anger dyscontrol. The findings also suggest that, even though aggression is sometimes a component of other psychological

disorders, the severity, intensity, and amount of impairment inherent in the aggressive outbursts associated with IED are above and beyond aggression found in other psychiatric disorders. This delimitation from other disorders is key to establishing diagnostic validity (Robins and Regier, 1991), and supports IED as a distinct mental disorder.

One potential limitation of the current study was the reliance on participants' retrospective self-report. In relation to questions concerning the frequency of aggressive acts, it was common for participants to divulge that it was difficult to remember things that happened years ago and that their responses were "estimates" or "[their] best guess". Future research might address these issues by implementing a more immediate and ecologically valid way of obtaining information from participants (e.g., journal keeping, automated phone surveys). Among the strengths of this study was the large clinical sample that was expertly and comprehensively assessed and demographically diverse. As such, the findings here are generalizable to a large set of individuals with IED. Furthermore, the study allowed for two comparison groups to separate the experience of IED from healthy individuals and individuals who suffer from non-IED psychopathology. This allowed us to disentangle differences in the experience of aggression that are specific to IED.

Our findings have implications for conceptualizations and treatment of IED. The results supply treatment providers with a better understanding of what an individual who suffers from this disorder goes through emotionally and physically during an aggressive outburst and how this experience is different from those with other psychological disorders. It also provides context in determining whether a client is presenting with a "typical" presentation of IED, and help decide where deviations in manualized treatments may be needed. By better understanding the experience of aggressive outbursts in highly dysregulated individuals, treatment providers are better equipped to provide quality care to their clients.

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References

- American Psychiatric Association, 2013. *Diagnostic and Statistical Manual of Mental Disorders: DSM-5*, 5th ed. American Psychiatric Association, Washington, DC.
- Anderson, C.A., Deuser, W.E., DeNeve, K.M., 1995. Hot temperatures, hostile affect, hostile cognition, and arousal: tests of a general model of affective aggression. *Personality and Social Psychology Bulletin* 21, 434–448.
- Anderson, C.A., Bushman, B.J., 2002. Human aggression. *Annual Review of Psychology* 53, 27–51.
- Baron, R.A., Neuman, J.H., 1996. Workplace violence and workplace aggression: evidence on their relative frequency and potential causes. *Aggressive Behavior* 22, 161–173.
- Barratt, E.S., Stanford, M.S., Dowdy, L., Liebman, M.J., Kent, T.A., 1999. Impulsive and premeditated aggression: a factor analysis of self-reported acts. *Psychiatry Research* 86, 163–173.
- Bedi, A., Courcy, F., Paquet, M., Harvey, S., 2013. Interpersonal aggression and burnout: the mediating role of psychological climate. *Stress and Health* 29 (5), 350–359.
- Böddeker, I., Stemmler, G., 2000. Who responds how and when to anger? The assessment of actual anger response styles and their relation to personality. *Cognition and Emotion* 14, 737–762.
- Bushman, B.J., Anderson, C.A., 2001. Is it time to pull the plug on hostile versus instrumental aggression dichotomy? *Psychological Review* 108 (1), 273.
- Coccaro, E.F., 2003. Intermittent explosive disorder. In: Coccaro, E.F. (Ed.), *Aggression: Psychiatric Assessment and Treatment*. Marcel Dekker Inc., New York, pp. 149–199.
- Coccaro, E.F., Kavoussi, R.J., Berman, M.E., Lish, J.D., 1998. Intermittent explosive disorder-revised: development, reliability, and validity of research criteria. *Comprehensive Psychiatry* 39 (6), 368–376.
- Coccaro, E.F., McCloskey, M.S., 2004. Intermittent explosive disorder interview module: validity and reliability. Unpublished manuscript, University of Chicago, Chicago, IL.
- Cohen, D.J., Eckhardt, C.I., Schagat, K.D., 1998. Attention allocation and habituation to anger-related stimuli during a visual search task. *Aggressive Behavior* 24, 399–409.
- Deffenbacher, J.L., Oetting, E.R., Lynch, R.S., Morris, C.D., 1996. The expression of anger and its consequences. *Behaviour Research and Therapy* 34, 575–590.
- Feshbach, S., 1964. The function of aggression and the regulation of aggressive drive. *Psychological Review* 71, 257–272.
- First, M.B., Gibbon, M., Spitzer, R.L., Williams, J.B., 1996. *User's Guide for the SCID-I (Research Version)*. Biometrics Research, New York.
- Geen, R.G., Donnerstein, E.I., 1998. *Human Aggression: Theories, Research, and Implications for Social Policy*. Academic Press, San Diego, California.
- Gross, J.J., 1998. The emerging field of emotion regulation: an integrative review. *Review of General Psychology* 2, 271.
- Harburg, E.H., Gleiberman, L., Russell, M., Cooper, L., 1991. Anger coping styles and blood pressure in black and white males. *Psychosomatic Medicine* 53, 153–164.
- Kessler, R.C., Coccaro, E.F., Fava, M., Jaeger, S., Jin, R., Walters, E., 2006. The prevalence and correlates of DSM-IV intermittent explosive disorder in the National Comorbidity Survey Replication. *Archives of General Psychiatry* 63 (6), 669–678.
- Kessler, R.C., Coccaro, E.F., Fava, M., McLaughlin, K.A., 2011. The phenomenology and epidemiology of intermittent explosive disorder. In: Grant, J.E., Potenza, M.N. (Eds.), *The Oxford Handbook of Impulse Control Disorders*. Oxford University Press, New York, pp. 149–164.
- Kosten, T.A., Rounsaville, B.J., 1992. Sensitivity of psychiatric diagnosis based on the best-estimate procedure. *American Journal of Psychiatry* 149, 1225–1227.
- Leckman, J.F., Sholomskas, D., Thompson, W.D., Belanger, A., Weissman, M.M., 1982. Best estimate of lifetime psychiatric diagnosis: a methodologic study. *Archives of General Psychiatry* 39, 879–883.
- McCloskey, M.S., Berman, M.E., Noblett, K.L., Coccaro, E.F., 2006. Intermittent explosive disorder-integrated research diagnostic criteria: convergent and discriminant validity. *Journal of Psychiatric Research* 40 (3), 231–242.
- McCloskey, M.S., Kleabir, K., Berman, M.E., Chen, E.Y., Coccaro, E.F., 2010. Unhealthy aggression: intermittent explosive disorder and adverse physical health outcomes. *Health Psychology* 29 (3), 324–332.
- McCloskey, M.S., Lee, R., Berman, M.E., Noblett, K.L., Coccaro, E.F., 2008a. The relationship between impulsive verbal aggression and intermittent explosive disorder. *Aggressive Behavior* 34, 51–60.
- McCloskey, M.S., Noblett, K.L., Deffenbacher, J.L., Gollan, J.K., Coccaro, E.F., 2008b. Cognitive-behavioral therapy for intermittent explosive disorder: a pilot randomized clinical trial. *Journal of Consulting and Clinical Psychology* 76, 876–886.
- Newton, R.R., Connelly, C.D., Landsverk, J.A., 2001. An examination of measurement characteristics and factorial validity of the revised conflict tactics scale. *Educational & Psychological Measurement* 61, 317–350.
- O'Leary, K., Tittle, N., Bromet, E., 2014. Risk factors for physical violence against partners in the U.S. *Psychology of Violence* 4 (1), 65–77.
- Structured Clinical Interview for DSM-IV Personality. In: Pfohl, B., Blum, N., Zimmerman, M. (Eds.), University of Iowa College of Medicine, Iowa City.
- Robins, L., Regier, D., 1991. *Psychiatric disorders in America: The epidemiologic catchment area*. Free Press, New York.
- Scott, K.M., Alonso, J., de Jonge, P., Viana, M., Liu, Z., O'Neill, S., Aguilar-Gaxiola, S., Bruffaerts, R., Caldas-de-Almeida, J.M., Stein, D.J., Angermeyer, M., Benjet, C., de Girolamo, G., Firuleasa, I.L., Hu, C., Kiejna, A., Kovess-Masfety, V., Levinson, D., Nakane, Y., Piazza, M., Posada-Villa, J.A., Khalaf, M.S., Lim, C.C., Kessler, R.C., 2013. Associations between DSM-IV mental disorders and onset of self-reported peptic ulcer in the World Mental Health Surveys. *Journal of Psychosomatic Research* 75 (2), 121–127.
- Tabachnick, B.G., Fidell, L.S., 1996. *Using Multivariate Statistics*, 3rd ed. Harper Collins, New York.
- World Health Organization, 2002. *World Report on Violence and Health*. World Health Organization, Geneva.
- Xu, J.Q., Kochanek, K.D., Murphy, S.L., Tejada-Vera, B., 2010. Deaths: final data for 2007. *National Vital Statistics Reports* 58 (19), National Center for Health Statistics; Hyattsville, MD.