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COMORBID INTERMITTENT EXPLOSIVE DISORDER AND POSTTRAUMATIC STRESS DISORDER: CLINICAL CORRELATES AND RELATIONSHIP TO SUICIDAL BEHAVIOR

Jennifer R. Fanning, Ph.D., **Royce Lee, M.D.**, and **Emil F. Coccaro, M.D.**

Clinical Neuroscience and Psychopharmacology Research Unit, Department of Psychiatry and Behavioral Neuroscience, Pritzker School of Medicine, The University of Chicago, Chicago, IL

Abstract

Objective—Posttraumatic stress disorder (PTSD) is associated with both aggressive and suicidal behavior. Recent research suggests that the diagnosis of Intermittent Explosive Disorder (IED), an impulse-control disorder characterized by repeated impulsive aggressive behavior, may help to identify individuals at risk for attempting suicide. Given the relationship between anger and PTSD, there is likely to be an increased prevalence of IED among individuals with PTSD; however, little is known about the overlap in these two disorders, including how individuals with comorbid IED and PTSD may differ from those with either disorder alone. The purpose of this study is to examine the clinical correlates of comorbid IED and PTSD and the contribution of these two disorders (among others) to lifetime suicide attempt and characteristics of suicidal behavior.

Method—In a large sample of community research volunteers (N=1460), we compared individuals with PTSD, IED, and comorbid PTSD and IED on measures of current mood, trait aggression, and trait impulsivity. We also examined the contributions of PTSD, IED, and other syndromal and personality disorders to the prediction of lifetime aggression and lifetime suicide attempt, and their relationship to characteristics of suicide attempts, including level of intent, use of violent versus non-violent means, and the medical seriousness of the attempt.

Results—Comorbid PTSD and IED was associated with significantly elevated levels of depression, anxiety, anger, aggression, and impulsivity, as well as with high rates of comorbidity with other psychiatric disorders. IED (β=.56, p<.001), but not PTSD, significantly and uniquely predicted lifetime aggressive behavior. Both IED and PTSD were associated with lifetime suicide attempt in multivariate analysis (ORs: 1.6 and 1.6, *p*s<.05). The results show that IED, when comorbid with PTSD, identifies a subgroup of individuals with particularly high levels of aggressive behavior and a high rate of suicide attempt (41.4% in this sample).

Conclusion—These findings add support to the notion that the diagnosis of IED may aid in identifying individuals at risk for aggressive and suicidal behavior.

Address Correspondence to: Jennifer R. Fanning, Ph.D., Clinical Neuroscience Research Unit, Department of Psychiatry and Behavioral Neuroscience, The University of Chicago, 5841 South Maryland Avenue, MC3077, Chicago, IL 60637, (773) 834-5942 (PHONE), (773) 834-7427 (FAX).

Keywords

Intermittent Explosive Disorder; Posttraumatic Stress Disorder; Aggression; Violence; Suicide Attempt

INTRODUCTION

It has long been recognized that anger and aggression are common experiences following a traumatic event or experience. “Sudden, explosive, aggressive reactions” were described as symptoms of “war neurosis” among military veterans decades before the diagnosis of posttraumatic stress disorder (PTSD) was included in the Diagnostic and Statistical Manual of Mental Disorders (1). One of the earliest large scale studies of war veterans, the National Vietnam Veterans Readjustment Survey (NVVRS) showed that exposure to war was associated with increased aggressive behavior even years after military service had ended, and that veterans who were exposed to the highest levels of war trauma reported the highest rates of violence (2). Subsequent studies have replicated these findings, showing higher rates of and more severe aggression associated with PTSD (3–10).

The link between PTSD and suicide risk has also received increased attention in recent years due to the rising rate of suicide in the military and the high rate of suicide among veterans relative to civilians (11–14). However, research has been mixed as to whether PTSD specifically is associated with completed suicide (15–19). Research has more consistently shown a link between suicidal ideation and suicide attempt and PTSD (14, 20–28). Impulse control disorders are also associated with suicidal ideation and suicide attempt, and their presence predicts the transition from suicidal ideation to suicide attempt (14, 29–32). One of these disorders, intermittent explosive disorder (IED), is characterized by frequent behavioral outbursts including verbal arguments and physical aggression directed toward property or other individuals. IED has emerged as a specific predictor of suicide attempt in multivariate analyses, and has been shown to predict suicide attempts among individuals with suicidal ideation (14, 32). In a recent study of U.S. Army soldiers, Nock and colleagues found that IED significantly predicted post-enlistment suicide attempt, even when accounting for other psychiatric disorders. In fact, IED was the only disorder that was significantly associated with suicide attempt among suicidal ideators (33).

IED has a general population prevalence of 5.4% in the US (34), and is likely more common among individuals with PTSD given that: (a) the two disorders co-occur with greater than chance frequency (34), and (b) that aggression is a feature of PTSD. Although aggression is a symptom of PTSD under DSM-5 criteria, it may be beneficial to clinicians to diagnose IED in individuals with PTSD who meet criteria, as these individuals are at heightened risk for future aggressive and self-aggressive behavior. However, it is unknown how individuals with comorbid PTSD and IED differ clinically from those with PTSD alone. The purpose of this study was to compare individuals with PTSD, IED, or the combination, and a mixed psychiatric control sample on measures of mood and behavior and on psychiatric comorbidity. We also examined whether IED, when considered alongside sociodemographic characteristics and other psychiatric disorders, including PTSD, uniquely predicts aggressive

behavior and lifetime suicide attempt. We expected that IED criteria would identify a subset of individuals with PTSD who are more aggressive, based on self-report and clinician-rated measure, and who show greater propensity toward suicidal behavior.

METHODS

Subjects

Participants in this study were 1460 adults aged 18 to 70 (M=34.3, SD=10.2) who participated in an ongoing program of research on the correlates of aggression and personality. Participants were 56% male (n=818) and 44% female (n=642). The self-identified racial composition of the sample was: 58% White, 33% African American, and 9% other. Participants were medically healthy and recruited through public service announcements seeking individuals who: (a) had psychosocial difficulties likely associated with a psychiatric or personality disorder; or (b) evidenced no significant psychopathology. Study procedures were evaluated and approved by the local Institutional Review Board (IRB). All subjects gave documented informed consent to participate in the research.

Diagnostic Assessment

Syndromal (i.e., Axis I) and personality disorder diagnoses were made according to DSM-IV criteria (35) using the Structured Clinical Interview for DSM Axis I Diagnoses (SCID-I; 36) for syndromal disorders and the Structured Interview for the Diagnosis of DSM Personality Disorder (SIDP; 37) for personality disorders. Intermittent explosive disorder (IED) was diagnosed using the IED-Integrated Research Criteria structured interview (38, 39) which also allows for a DSM-5 diagnosis of IED (40). Other diagnoses assessed included mood disorder (including major depression, depression not otherwise specific [NOS], dysthymia, cyclothymia, and adjustment disorder), non-PTSD anxiety disorder (including social anxiety disorder, generalized anxiety disorder, panic disorder, and agoraphobia), non-IED impulse control disorder (ICD; including pathological gambling, kleptomania, trichotillomania, pyromania, and ICD-NOS), personality disorder (Clusters A, B, and C), lifetime alcohol and drug use disorders (including abuse and dependence), and childhood disruptive behavior disorders (DBD), including attention-deficit/hyperactivity disorder (ADHD), oppositional defiant disorder (ODD), and conduct disorder (CD). Syndromal disorders were coded as current or lifetime. History of suicide attempt was defined as a conscious act, committed (even if ambivalently) with the intent to end one's life using means one believed could have achieved this goal. Diagnostic raters also assessed characteristics of the suicidal behavior. Suicidal intent for the most serious suicide attempt was scored on a 1–6 scale (1=obviously no intent, 2=minimal intent, 3=ambiguous intent, 4=serious intent, 5=very serious intent, 6=extreme intent with careful planning and every expectation of death). The most serious attempt was rated as violent or non-violent. Violent attempts were made using gunshot, knife, wound, hanging, or jumping. Non-violent attempts included superficial cuts, overdose, gas, and drowning. Finally, the medical seriousness of the attempt was rated on a 1–6 scale (1=no danger, 2=minimal, 3=mild, 4=moderate, 5=severe, 6=extreme-for example, resulting in respiratory arrest or prolonged coma). Unclear cases were classified as missing data. Current alcohol or drug use disorder, lifetime bipolar disorder, schizophrenia or other psychotic disorder, and mental retardation

were exclusionary for study participation. Diagnostic raters had a master's degree or doctorate in clinical psychology and underwent rigorous diagnostic training including didactics, vicarious ratings, and reliability training, which resulted in good to excellent inter-rater reliabilities (mean kappa = 84 ± .05; range .79 to .93). Final diagnoses were established using a team consensus best estimate procedure (41, 42).

Healthy control (HC) participants had no current or past Axis I disorder or personality disorder. Psychiatric controls (PC) had a current or lifetime syndromal or personality disorder diagnosis but not current or past PTSD or IED. IED+PTSD participants had both diagnoses. "IED" participants had no lifetime PTSD, and "PTSD" participants had no lifetime IED. Subjects reported a variety of DSM traumatic events; physical assault and sexual abuse were the most frequent index traumas reported by individuals with PTSD. Of the subjects with any DSM-IV diagnosis, most (77.8%) reported: (a) a history of formal psychiatric evaluation and/or treatment (59.7); or (b) a history of behavioral disturbance during which the subject, or others, thought they should have sought mental health services but did not (55.6%).

Psychometric Assessment

Depression symptom severity was assessed using the Beck Depression Inventory (BDI-II; 43). Anxiety was assessed using the Beck Anxiety Inventory (BAI; 44). Anger and hostility were assessed using subscales of the Buss Perry Aggression Questionnaire (BPAQ; 45). Self-reported physical and verbal aggressive tendencies were also assessed using subscales of the BPAQ. Actual history of aggressive behavior was assessed using the Life History of Aggression scale (Aggression subscale; LHA; 46). A composite aggression score was derived by summing the Z-scores for the BPAQ and LHA. Trait impulsivity was assessed using the Barratt Impulsivity Scale (BIS-11; 47), while actual past impulsive behavior was assessed using the Lifetime History of Impulsive Behavior Interview (LHIB; 48). A composite impulsivity score was derived by summing these two scales. Finally, diagnostic raters assessed psychosocial functioning using the Global Assessment of Functioning (GAF) scale (35).

Statistical Analyses

Differences between groups on dimensional measures were assessed using ANOVA F statistic followed by Tukey's HSD post hoc test. Levene's test was used to assess heterogeneity of variance between groups and, when significant, Brown-Forsythe test statistic (F* statistic) was used along with Games-Howell post hoc test. Relationships between categorical variables were assessed using Fisher's Exact Test (FET) and odds ratios (ORs). Multivariate analyses of lifetime history of aggressive behavior employed a hierarchical multiple linear regression with sociodemographic variables entered in Step 1 (age, gender, race, and SES) and lifetime psychiatric disorders were entered in Step 2 (mood disorder, anxiety disorder, PTSD, IED, non-IED impulse control disorder, personality disorders by cluster, alcohol use disorder, drug use disorder, and any lifetime disruptive behavior disorder [DBD]). The analysis of suicide attempt was carried out using hierarchical logistic regression analyses using the same steps and variables. Finally, we used separate hierarchical multiple regression and logistic regression models to investigate significant

predictors of: suicidal intent, use of violent means, and medical seriousness of the attempt for the most serious attempt. Alpha was set to .05 (two-tailed) for all analyses.

RESULTS

Demographic Characteristics of the Sample

Differences between groups in age, gender, race, and SES are shown in Table 1.

Assessment of Depression, Anxiety, Anger and Related Behaviors, and Psychosocial Functioning

The study groups differed on measures of depression severity, anxiety, anger, aggression, impulsivity, and psychosocial functioning (see Table 2; F statistics reported in Supplementary eTable 1). Across symptoms, participants with comorbid IED+PTSD had the highest symptom scores and lowest psychosocial functioning. When aggression indices were combined (sum of Z-scores for LHA and BPAQ total score), the five groups differed significantly from each other ($F^*[4,1132]=384.2$, $p<.001$). All contrasts were significant ($p<.05$; Games-Howell; see Figure 1). The IED+PTSD group had the highest aggression composite score of all groups, followed by the IED, then PTSD, groups. On composite impulsivity, the IED+PTSD and PTSD groups reported the greatest impulsivity. Scores were significantly higher for these groups than for the IED group, who in turn had higher scores than the PC and HC groups (Figure 1).

Lifetime Comorbidity

Participants with IED and PTSD had high rates of lifetime comorbidity (see Table 3). Compared to other groups, individuals with comorbid IED and PTSD (n=111) had particularly high rates of comorbid mood disorder (87.4%), non-PTSD anxiety disorder (39.6%), non-IED impulse control disorder (15.3%), Cluster B personality disorder (71.2%), Cluster C personality disorder (40.5%), and lifetime alcohol use disorder (54.1%). A substantial percentage of this group (41.4%) had attempted suicide during their lifetime. The majority of participants in the IED+PTSD group (66.4%) had a history of childhood disruptive behavior disorder (DBD), a rate that was nearly twice as high or more compared to the other psychiatric groups.

Predictors of Aggression and Suicide Attempt

We examined predictors of lifetime aggressive behavior among all subjects who completed the Life History of Aggression (LHA) assessment (N=1300, including 294 HC). For lifetime history of aggressive behavior, sociodemographic variables accounted for 3% of the variance in aggression (Step 1; $F[4,1295]=9.6$, $p<.001$). The addition of the lifetime psychiatric variables in Step 2 explained an additional 57% of the variance in aggression (total $R^2=.59$, $\Delta F[11,1284]=162.9$, $p<.001$). In the final model, lifetime depressive disorder ($\beta=.09$, $t=4.2$, $p<.001$), IED diagnosis ($\beta=.56$, $t=27.1$, $p<.001$), Cluster B personality disorder ($\beta=.08$, $t=3.4$, $p=.001$), alcohol use disorder ($\beta=.10$, $t=4.9$, $p<.001$), and disruptive behavior disorder ($\beta=.16$, $t=7.6$, $p<.001$) were significant predictors of aggressive behavior. Gender was associated with aggression at the level of a trend ($\beta=-.04$, $t=-1.9$, $p=.056$), with male gender being associated with aggressive behavior.

Next, we examined predictors of lifetime suicide attempt among all subjects for whom suicide attempt was assessed (N=1440, including 308 HC). Sociodemographic variables were significant predictors of lifetime suicide attempt (Step 1: Chi-square[4]=46.4, p<.001; see Table 4). The addition of the psychiatric variables in Step 2 significantly improved the model fit (ΔChi-square[11]=228.7, p<.001). Significant predictors of suicide attempt are shown in Table 4. Female gender and lower SES were significant predictors of suicide attempt as were lifetime mood disorder, IED, PTSD, Cluster B and C personality disorders, and alcohol use disorder (marginally). The largest odds were associated with mood disorder (OR=5.0), while all other disorders had similar odds in relation to suicide attempt (ORs = 1.4–2.1).

Detailed information on reported suicide attempts was available for 845 subjects (including 168 HC), of whom 129 had a positive history of suicide attempt (HC=0). The remaining analyses are conducted on this detailed data. Lifetime diagnoses of these subjects are displayed in Supplemental Table E2. We examined predictors of the level of intent associated with the most serious suicide attempt using hierarchical multiple regression. Given the smaller number of subjects available for these analyses, we reduced the number of predictors to demographic variables (Step 1: gender, SES) and lifetime diagnostic categories that were significantly related to suicide attempt in the previous analysis (Step 2: mood disorder, IED, PTSD, Cluster B and Cluster C personality disorders, and alcohol use disorder). For suicide intent, the mean rating was 3.07 (SD=1.56, N=122). Demographic characteristics did not significantly predict suicidal intent, F(2,119)=1.67, p=.193. Lifetime diagnostic information improved the model fit, ΔF(6,113)=2.48, p=.027. The final model explained 8% of the variance in suicidal intent. Among the predictors, only Cluster C personality disorder traits positively predicted level of intent (β=.19, t=2.0, p=.046), while lifetime IED diagnosis (β=.−21, t=−2.32, p=.022) was associated with lower suicidal intent.

Most subjects reported using non-violent methods to attempt suicide (non-violent: n=104; violent: n=19). Demographic variables only marginally predicted violent means of attempt, Chi-square(2)=4.67, p=.097. The addition of diagnostic information did not improve model fit, Chi-square(6)=5.67, p=.461. Among the demographic variables (Model Step 1), male gender was associated with use of violent means, B=−1.10, SE=0.51, Wald χ^2=.4.58, p=.032, OR=3.0 (95% CI: 1.1–8.2).

The average rating for medical serious of the most serious suicide attempt was 3.04 (SD=1.16, N=123). Demographic variables (Step 1) significantly predicted medical seriousness, F(2,120)=6.85, p=.002. The addition of lifetime diagnostic information did not significantly improve model fit, ΔF(6,114)=1.38, p=.228. Among demographic predictors (Step 1), female gender was associated with greater medical seriousness, (β=.28, t=3.3, p=.001).

DISCUSSION

In this study, we examined individuals with PTSD and IED. Symptoms of depression and hostility were highest in the PTSD and IED+PTSD groups, suggesting they are more closely associated with PTSD than with IED. Patients with PTSD only were more physically

aggressive than psychiatric control subjects and had more extensive life histories of aggression, although they were not more angry, hostile, or verbally aggressive than psychiatric control subjects. These findings partially replicate earlier associations between PTSD and anger, aggression, and hostility (6, 9, 49, 50). Patients with comorbid IED and PTSD, compared to PTSD-only subjects, reported more anger, verbal aggressiveness, physical aggressiveness, and life history of aggression. Thus, although PTSD itself is associated with anger and aggression, the diagnosis of IED identifies individuals with PTSD who have higher levels of anger and interpersonal aggression and more significant histories of actual aggressive behavior. Participants who had either PTSD or IED (and those with comorbid IED and PTSD) had lower psychosocial functioning on average than the psychiatric control group. The three groups also had higher impulsivity scores than psychiatric controls and healthy controls, but did not differ significantly from each other.

Participants with comorbid IED and PTSD had significant lifetime comorbidity (see Table 3). Individuals with comorbid IED and PTSD had particularly high rates of comorbidity with mood disorder (87.4%), Cluster B personality disorder (71.2%), and lifetime alcohol use disorder (54.1%) and a substantial percentage of this group (41.4%) had attempted suicide during their lifetime. The majority of participants in the IED+PTSD group (66.4%) had a history of childhood disruptive behavior disorder (DBD), a rate that was nearly twice as high or more compared to the other psychiatric groups. Given that a high percentage (49%) of participants was recruited because of their significant aggressive behavior, these results are best generalized to aggressive individuals. Nevertheless, these findings highlight the significant level of distress and comorbidity, the chronic nature of emotional and behavioral difficulties, and the potential for serious outcomes such as suicide in this group of individuals.

In the multivariate analysis predicting actual history of aggressive behavior a small number of significant predictors emerged, including male gender (marginally), mood disorder, IED, Cluster B personality disorder, alcohol use disorder, and disruptive behavior disorder, all of which have been identified in prior studies of violence prediction (51, 52). When considered alongside other disorders (including IED) PTSD did not emerge as a significant predictor of aggression. Thus, the symptoms of PTSD that confer risk for aggression are largely shared with other disorders, including depressive disorders, IED, and substance use disorders. While IED also shows increased comorbidity with mood disorders and substance use disorders, the core feature of the disorder involves acting out aggressive behavior, making it a better predictor of lifetime aggressive behavior than PTSD or other disorders.

The significant predictors of suicide attempt that emerged from the multivariate analysis largely replicated prior research by showing increased risk for suicidal behavior associated with female gender, mood disorder, personality disorder, alcohol use disorder (marginally), and IED (30, 32, 53, 54). An analysis of suicide attempt data from the National Comorbidity Survey found that (among other predictors) female gender, mood disorder, PTSD, substance use disorder, and antisocial personality disorder significantly predicted past suicide attempt in multivariate analyses (54). IED was not included as a diagnostic category in this study. Odds ratios for PTSD and IED predicting suicide attempt in this study were of similar magnitude to prior studies (OR=1.6; 14, 32) although they were lower than that observed in

active duty military personnel (33). While our analyses did not test the interactive effects of IED and PTSD on suicide attempt, a substantial percentage (41%) of subjects with lifetime PTSD and IED reported a past suicide attempt.

Finally, we examined how PTSD, IED, and other psychiatric diagnoses and demographic factors related to characteristics of reported suicide attempts, including suicidal intent, use of violent means, and medical seriousness of the attempt. Of the examined predictor variables, only Cluster C PD diagnosis (which includes avoidant, obsessive-compulsive, and dependent personality disorders) was positively associated with suicidal intent. IED was negatively associated with suicide attempt, suggesting that IED subjects had less intent associated with their most serious suicide attempt. This may be because IED subjects were more impulsive in their attempts, although this was not assessed directly. Overall, the predictor variables only explained 8% of the variance in suicidal intent. Most subjects (85%) used non-violent means to attempt suicide. Lifetime psychiatric diagnoses did not aid in predicting use of violent versus non-violent means. Among the predictor variables, only male gender was a significant predictor of violent means. Psychiatric diagnoses also did not aid in predicting the medical seriousness of the most serious attempt. In contrast to suicidal intent, female gender was associated with more medically serious attempts. This may reflect the discordance between violence of method and seriousness of the attempt (for example, superficial cut versus ingestion of a substance). Previous research has suggested that women are more likely to ingest a substance compared to men (55). In a previous study comparing suicide attempt characteristics of borderline personality disorder (BPD) and depressed patients, the two groups did not differ in suicidal intent or use of violent versus non-violent means. However, BPD subjects made marginally more lethal attempts and engaged in less planning (56). Overall, in this sample, psychiatric diagnoses contribute little or not at all to predicting the characteristics of suicide attempt, which is overall consistent with previous research (56–58). It is possible that these characteristics are more closely related to proximal risk factors for suicidal behavior such as stressful life events, hopelessness, and help-seeking behavior (57–60).

While not widely diagnosed in clinical practice, IED has emerged as a significant predictor of suicidal behavior in several recent studies. This is consistent with the fact that impulsive aggression is a known risk-factor for suicidal behavior (61–63). Previous research suggests that some disorders increase the risk for suicide by increasing suicidal ideation, while other disorders, particularly those characterized by impulsivity, increase the risk of acting on suicidal thoughts (30). This distinction is important as suicide attempt is rare and more difficult to predict than suicidal ideation (54). Prior research shows that disorders characterized by impulsiveness and aggression, including PTSD, conduct disorder, and substance use disorders are the best predictors of the transition from suicidal ideation to suicide attempt (14, 32). Within the large-scale study of current military personnel by Nock and colleagues (2014), PTSD did not predict suicide attempt or transition to suicide attempt among ideators. IED was the only psychiatric diagnosis that predicted suicide attempt among suicidal ideators. Therefore, in settings where PTSD is prevalent, such as in the military and in VA mental health clinics, identifying individuals with IED may aid in identifying individuals who may be at increased risk for suicide.

This study has limitations worth noting. First, these analyses were conducted on a research sample recruited from the community to study impulsive aggression. The sample thus includes a disproportionate number of individuals with IED relative to other disorders. Although patients with psychopathology other than IED were recruited to serve as control subjects, the number of non-IED patients with a given disorder (i.e., PTSD) is small by contrast which may limit the generalizability of the findings. Second, ascertainment of subjects may limit the generalizability of these findings in that these involved subjects who volunteered for a research study, rather than for clinical treatment. However, more than 70% of subjects with a psychiatric diagnosis reported a past history of psychiatric treatment or of having episodes behavioral disturbance for which they, or others, thought they should have sought mental health services but did not; thus, these subjects can be seen as largely comparable to subjects seen in outpatient psychiatric settings. Similarly, the current sample excluded individuals with current substance use disorders or with serious mental illness. These exclusion criteria reduce potential confounds but also limit the generalizability of the findings. An additional limitation involves the cross-sectional and retrospective nature of the study, which limits the ability to draw causal inferences about the relationships among study variables. In particular, lifetime aggression, lifetime suicide attempt, and characteristics of suicide attempt were based on retrospective reports of past behavior. A final limitation involves the use of DSM-IV criteria to diagnose PTSD. DSM-5 criteria include aggressive behavior (where DSM-IV referred to “irritability”) and “reckless and self-destructive” behavior in the criteria. It is possible that the DSM-5 criteria identify individuals with a higher rate of suicide attempt. However, cases of PTSD identified by DSM-IV and DSM5 criteria largely overlap, and instances of meeting PTSD criteria because of suicidal behavior (e.g. “self-destructive behavior”) are likely to be rare (64). Furthermore, research using DSM-IV and earlier criteria shows a robust relationship between PTSD and aggression even when aggression was not explicitly included in the criteria (e.g., 9).

Aggression and suicide are serious problems affecting individuals, families, and society, and individuals who develop PTSD are at particular risk for these negative outcomes. Identifying those who may be at risk for violent outcomes is challenging for those seeking to intervene, including military personnel and providers of mental health services. It is clear that IED, as a disorder of impulsive aggression, is a useful diagnosis for identifying those who are likely to be aggressive in the future. A growing literature also suggests that IED may aid in identifying individuals at risk for suicidal behavior. Although criteria for PTSD in DSM-5 refer to physical aggression and self-destructive behavior, noting the presence of IED may aid in distinguishing those who are at increased risk of aggression and suicide, particularly in settings where exposure to trauma is prevalent and rates of PTSD are high.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights

- Intermittent explosive disorder, when comorbid with posttraumatic stress disorder, identifies a subset of individuals with significant depression, anxiety, impulsivity, aggression, and poor psychosocial functioning.
- Both IED and PTSD significantly predict lifetime suicide attempt in multivariate analyses.
- 41.4% of subjects who met criteria for both IED and PTSD reported a lifetime history of suicide attempt.
- This research suggests that the diagnosis of IED is clinically useful for identifying individuals who are at risk for violence and suicidal behavior.

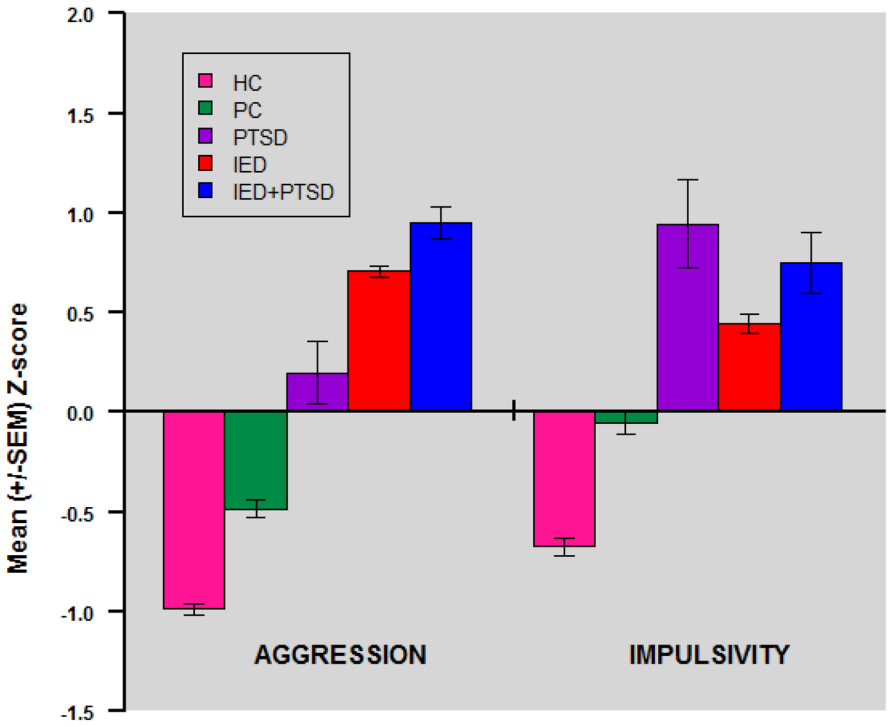

Figure 1.

Mood symptoms by diagnostic group. Groups are based on current diagnoses. HC=Health controls, PC=psychiatric controls, PTSD=posttraumatic stress disorder, IED=intermittent explosive disorder, IED+PTSD=comorbid IED and PTSD. AGG (Ns: HC=295; PC=233; PTSD=22; IED=520; IED+PTSD=63) = Sum of Z-scores: Life History of Aggression (LHA) and Buss Perry Aggression Questionnaire (BPAQ), IMP (Ns: HC=271; PC=218; PTSD=19; IED=315; IED+PTSD=43) = Sum of Z-scores: Barratt Impulsivity Scale (BIS) and Life History of Impulsive Behavior (LHIB). See Results for explanation of significant contrasts.

TABLE 1

Sociodemographic variables for study groups

	HC	PC	PTSD	IED	PTSD+I ED	Differences
Age (Mn, SD)	31.6 (10.1)	33.0 (9.3)	36.4 (12.4)	35.5 (10.3)	35.0 (10.4)	IED > HC, PC
Sex (N, % male)	164 (53.1%)	163 (62.9%)	4 (14.3%)	335 (57.7%)	17 (25.0%)	Female > in PTSD, IED+PTSD
Race (N, % white)	186 (60.2%)	145 (56.0%)	10 (35.7%)	331 (57.0%)	25 (36.8%)	Non-white > in IED+PTSD
SES (Mn, SD)	38.9 (13.9)	32.0 (13.2)	33.8 (13.3)	36.7 (13.0)	31.4 (11.7)	HC, IED > PC, IED+PTSD

Groups based on current diagnosis. HC=healthy controls, PC=psychiatric controls, PTSD=posttraumatic stress disorder, IED=intermittent explosive disorder, IED+PTSD=comorbid IED and PTSD, SES=Hollingshead socioeconomic status.

TABLE 2

Mood, behavior, and psychosocial functioning by diagnostic group

	HC		PTSD		IED		PTSD+IED		Differences
	n	M (SD)	n	M (SD)	n	M (SD)	n	M (SD)	n	M (SD)	
Depression†	155	4.0 (10.5)	83	11.8 (12.2)	19	24.0 (14.8)	239	16.1 (12.4)	45	25.7 (12.7)	IED+PTSD, PTSD >IED, PC > HC
Anxiety	116	23.1 (3.3)	65	27.1 (6.5)	12	34.8 (11.7)	163	30.1 (9.1)	28	36.8 (10.9)	IED+PTSD > IED > PC > HC
Anger†	149	12.5 (5.2)	83	16.3 (6.4)	17	18.6 (7.5)	237	24.6 (6.7)	43	24.9 (6.2)	IED+PTSD, IED >PTSD, PC > HC
Hostility†	149	14.1 (5.8)	84	20.5 (6.9)	19	24.0 (8.0)	239	23.7 (7.4)	43	28.4 (6.5)	IED+PTSD > IED > PC > HC; PTSD > HC
Physical Aggression†	149	15.3 (7.1)	84	18.7 (7.5)	19	22.4 (8.2)	239	28.0 (8.8)	43	30.7 (8.4)	IED+PTSD > IED > PTSD > PC > HC
Verbal Aggression†	148	12.4 (3.6)	84	14.9 (4.0)	19	14.8 (4.0)	239	17.8 (4.3)	43	18.5 (4.6)	IED+PTSD, IED > PTSD, PC, HC; PC > HC
Life History Aggression†	294	4.6 (3.6)	231	8.5 (5.4)	19	13.7 (6.1)	506	17.7 (4.8)	55	19.3 (3.9)	IED+PTSD > IED,PTSD > PC > HC
Trait Impulsivity†	264	55.7 (9.1)	216	62.9 (10.1)	19	75.3 (12.9)	304	68.6 (11.2)	43	72.3 (13.0)	IED+PTSD, IED, PTSD > PC, HC
Life History Impulsivity	94	21.7 (13.5)	41	38.3 (15.3)	9	54.7 (22.2)	134	48.4 (16.5)	26	54.4 (13.5)	IED+PTSD, IED, PTSD > PC, HC
Global Functioning†	308	83.4 (6.9)	259	61.9 (9.1)	28	51.4 (8.6)	580	56.0 (7.9)	68	49.2 (6.5)	IED+PTSD < IED < PC < HC; PTSD < PC

Groups based on current diagnosis. HC=Health controls, PC=psychiatric controls, PTSD=posttraumatic stress disorder, IED=intermittent explosive disorder, IED+PTSD=comorbid IED and PTSD.

†Browne-Forsythe (F*) statistic with Games-Howell post hoc test used due to heterogeneous variances across groups. See Supplementary Materials for statistics.

TABLE 3

Lifetime comorbidity by diagnostic group

	PC (n=329)		PTSD (n=28)		IED (n=683)		IED+PTSD (n=111)	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Lifetime Axis I Disorder								
Any Axis I Disorder	264	80.2	28	100.0	683	100.0	111	100.0
Any Mood Disorder	134	40.7	23	82.1	377	55.2	97	87.4
Non-PTSD Anxiety Disorder	33	10.0	10	35.7	95	13.9	44	39.6
Non-IED Impulse Control Disorder	8	2.4	2	7.1	36	5.3	17	15.3
Axis II Disorder								
Any Axis II Disorder	233	70.8	26	92.9	602	88.1	110	99.1
Cluster A Disorder	31	9.4	2	7.1	98	14.3	34	30.6
Cluster B Disorder	65	19.8	15	53.6	266	38.9	79	71.2
Cluster C Disorder	58	17.6	13	46.4	150	22.0	45	40.5
Lifetime Substance Use Disorder								
Alcohol Use Disorder	121	36.8	11	39.3	284	41.6	60	54.1
Drug Use Disorder	23	7.0	1	3.6	82	12.0	10	9.0
Lifetime Disruptive Behavior Disorder								
Any Disruptive Behavior Disorder	48	14.6	9	32.1	240	35.2	73	66.4
ADHD	18	5.5	3	10.7	98	14.3	29	26.1
Oppositional Defiant Disorder	15	4.6	2	7.1	64	9.4	23	20.9
Conduct Disorder	20	6.1	5	17.9	143	20.9	40	36.0
Suicide Attempt	27	8.2	10	35.7	107	15.7	46	41.4

Groups based on lifetime diagnoses; HC=healthy controls, PC=psychiatric controls, PTSD=posttraumatic stress disorder, IED=intermittent explosive disorder, IED+PTSD=comorbid IED and PTSD, ADHD=attention-deficit/hyperactivity disorder. *Note.* % is percent of each group (column) meeting criteria for each disorder (row).

TABLE 4

Sociodemographic and psychiatric predictors of lifetime suicide attempt (N=1440)

Suicide Attempt	X^2	B	Wald X^2	p-value	OR (95% CI)
Step 1	46.4 (4) ***				
Gender		0.61	9.93	.002	1.8 (1.3–2.7)
SES		-0.02	8.42	.004	1.0 (1.0–1.0)
Step 2	275.1 (15)***				
Mood Disorder		1.62	43.74	<.001	5.0 (3.1–8.1)
Intermittent Explosive Disorder		0.49	4.56	.033	1.6 (1.0–2.6)
Posttraumatic Stress Disorder		0.48	4.03	.045	1.6 (1.0–2.6)
Cluster B Personality Disorder		0.75	13.55	<.001	2.1 (1.4–3.2)
Cluster C Personality Disorder		0.42	4.16	.041	1.5 (1.0–2.3)
Alcohol Use Disorder		0.36	3.55	.060†	1.4 (1.0–2.0)

SES=socioeconomic status;

† = statistical trend.