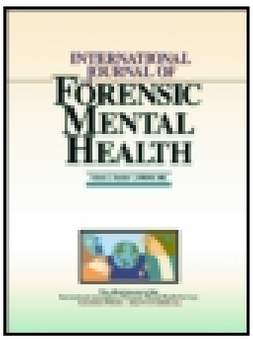

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Criminally Explosive: Intermittent Explosive Disorder, Criminal Careers, and Psychopathology among Federal Correctional Clients

Matt DeLisi[a], Michael Elbert[b], Daniel Caropreso[b], Katherine Tahja[b], Timothy Heinrichs[b], and Alan Drury[b]

[a]Department of Sociology, Criminal Justice Studies Program, Iowa State University, Ames, United States; [b]United States Probation, 110 East Court Avenue, Des Moines, Iowa, United States

ABSTRACT

Intermittent Explosive Disorder (IED) is a relatively rare psychiatric condition characterized by aggression, explosive outbursts towards people and property, and very poorly regulated emotional and behavioral control, but has rarely been studied in a criminal justice context. Drawing on data from 863 federal correctional clients from a supervised release population in the Midwestern United States, the current study examined the lifetime prevalence and correlates of IED and its associations with criminal careers. The lifetime prevalence of IED was 2.6% with another 1% of clients exhibiting symptoms of the disorder. Poisson and negative binomial regression models have shown that IED was significantly associated with arrests for murder, attempted murder, interference with police, aggravated assault, simple assault, and domestic assault despite controls for serious behavioral disorders, age of first arrest, and demographics. Clients with IED were also dramatically more likely to be habitual offenders and accumulate chronic arrests for assault-related crimes. These offenders pose considerable risk to staff safety and should be supervised with the highest level of supervision.

KEYWORDS

Intermittent Explosive Disorder; crime; psychopathology; criminal careers; violence

Intermittent Explosive Disorder (IED) has existed in various incarnations throughout psychiatric history. Since the initial *Diagnostic and Statistical Manual of Mental Disorders* published in 1952, the condition has been referred to as "passive-aggressive personality, aggressive type," "explosive personality," "isolated explosive disorder," and "intermittent explosive disorder." Despite variations in the actual name of the disorder, Intermittent Explosive Disorder has always been characterized by features relating to aggression, explosive outbursts towards people and property, and very poorly regulated emotional and behavioral control and is commonly comorbid with other psychiatric conditions (Cocarro, 2000, 2012; Felthous, Bryant, Wingerter, & Barratt, 1991; Fernandez & Johnson, 2016; Galovski, Blanchard, & Veazey, 2002; Leppink et al., 2014; Lion, 1992; McElroy, Hudson, Pope, Keck, & Aizley, 1992).[1]

In the *DSM-5*, IED contains the following criteria: (1) recurrent outbursts that demonstrate an inability to control impulses evidenced by verbal aggression or physical aggression; (2) aggressive behavior that is grossly disproportionate to the magnitude of the psychosocial stressors; (3) the outbursts are not premeditated and serve no premeditated purpose; (4) the outbursts cause distress or impairment in functioning; (5) the individual must be at least six years old; and (6) the recurrent outbursts are not explained by another mental disorder, medical disorder, or substance use. There are also two additional criteria for the types of aggressive outbursts. Criterion A1 is that episodes, such as temper tantrums or tirades occur on average twice weekly for three months. Criterion A2 is that more severe destructive or assaultive episodes occur on average three times over a 12-month period (American Psychiatric Association, 2013).

Within psychiatry, there are disparate estimates on the prevalence of IED. In the National Comorbidity Survey Replication, Kessler, Coccaro, Fava, Jaeger, Jin, and Walters (2006) employed three definitions of IED that included a broad specification defined as three lifetime attacks and one in the past 12 months, an intermediate specification defined as three lifetime attacks in the same year and at least one attack in the past 12 months, and a narrow specification defined as three attacks in the past 12 months (Kessler et al., 2006). The lifetime prevalence was

CONTACT Matt DeLisi delisi@iastate.edu Department of Sociology, Criminal Justice Studies Program, Iowa State University, 203A East Hall, Ames, Iowa 50011–1070.

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[1]IED manifests even in otherwise innocuous contexts. For instance, Galovski et al. (2002) compared 10 drivers who had the disorder to 20 aggressive drivers who did not have the disorder and 20 non-aggressive driving controls. Those with Intermittent Explosive Disorder were more assaultive, resentful, and impatient and also tended to be more hostile and have angry temperament. These findings provide psychiatric insight into the grossly disproportionate aggressive driving behaviors evinced in "road rage" incidents.

7.3% for the broad specification and 5.4% for the other specifications. Across specifications, the correlates of IED were male sex, younger age, lower education, and lower family income. IED also showed significant comorbidity with psychiatric conditions often evinced by criminal justice clients including Oppositional Defiant Disorder, Conduct Disorder, Attention-deficit/Hyperactivity Disorder (ADHD), and substance abuse and dependence. In the National Comorbidity Survey Replication Adolescent Supplement, the lifetime prevalence of IED was 7.8% although 63% of youth reported lifetime anger attacks that involved violent behavior, threatening violence, or destroying property (McLaughlin et al., 2012). In the National Comorbidity Survey-Adolescent Supplement, the lifetime prevalence of IED was estimated at 14.1% (Coker, Smith, Westphal, Zonana, & McKee, 2014).

Other large-scale studies reported divergent prevalence estimates of IED. For instance, a taxometric study of data from the Collaborative Psychiatric Epidemiology Surveys found evidence of a taxon of IED individuals that comprised just 1.6% of the sample (Ahmed, Green, McCloskey, & Berman, 2010) and whose symptoms were not attributed to alcohol or substance use disorders, mental illness or medication, and depression. The IED taxon had a prevalence of family history of anger attacks that was greater than 20 times higher than the comparison group and had a prevalence of treatment-seeking that was 57 times higher than the comparison group. An examination of 1,300 psychiatric outpatients at Rhode Island Hospital revealed a lifetime prevalence of 6.3% (Coccaro, Posternak, & Zimmerman, 2005). Coccaro (2012) summarized prevalence studies and reported a mean IED broadly defined lifetime prevalence of 6.9% and a narrow-criteria lifetime prevalence of 5.4% among studies in the United States. For studies outside the United States, the mean IED broadly defined lifetime prevalence was 3% and the narrow-criteria lifetime prevalence was 1.6%.

Several forms of childhood or adulthood exposure to trauma and criminal victimization have been associated with a subsequent IED. Using data from the National Comorbidity Survey Replication, Nickerson, Aderka, Bryant, and Hofmann (2012) reported several childhood traumas that were associated with elevated odds ratios (OR) for developing IED. These included physical abuse by parents (OR = 2.7), witnessing physical fights at home (OR = 3.1), physical abuse by an intimate partner (OR = 2.6), aggravated assault victimization (OR = 4.7), armed robbery victimization (OR = 3.5), rape victimization (OR = 2.2), and seeing a dead body (OR = 1.8). Trauma experiences during adulthood yielded smaller but still significant odds ratios of IED. Others have shown that compared to personality-disordered individuals without the condition, those with IED were characterized by greater lifetime aggression, more hostility, greater impulsivity, prior history of self-injurious behavior, and lower global functioning (Coccaro, 2011; McCloskey, Berman, Noblett, & Coccaro, 2006). Moreover, the prevalence of Antisocial Personality Disorder was greater than two times higher among those with IED than those without IED (Coccaro, Kavoussi, Berman, & Lish, 1998).

Although a psychiatric concept, there are clear linkages between IED and constructs that are relevant to a criminological readership.[2] For instance, Coker et al. (2014) reported sizeable odds ratios indicating that youth with lifetime IED diagnosis were much more likely to be arrested for burglary or theft (OR = 6.2), violent crime (OR = 11.0), or any other crime (OR = 8.8) compared to youth without IED. These odds ratios were only exceeded by youth who had Conduct Disorder or Oppositional Defiant Disorder among disruptive behavior disorders. Among the 9,397 youth in the National Comorbidity Survey-Adolescent Supplement who had not been arrested, IED nevertheless conferred a higher likelihood for involvement in any crime (OR = 6.4), violent crime (OR = 9.9), and burglary or theft (OR = 4.4). In other words, Intermittent Explosive Disorder has been shown to be antedated by adverse childhood experiences and to be tightly connected with criminal offending and criminal victimization.

Unfortunately, the study of IED is mostly absent from studies of the criminal justice system. For instance, a keyword search of "intermittent explosive disorder" in Scopus produced 303 refereed journal articles published in medical, forensic psychology, and clinical psychology, yet just two studies were published in a criminal justice-oriented journal. The first study (Felthous et al., 2009) published in the *Journal of Forensic Sciences* was an examination of impulsive aggression among patients with severe mental disorders and primarily dealt with the inter-rater reliability of a rating instrument rather than IED itself. The second study (Henrichs, Bogaerts, Sijtsema, & Klerx-van Mierlo, 2015) published in the *Journal of Interpersonal Violence* was an investigation of intimate partner violence perpetrators and found that IED was significantly more common in the psychopathology of

[2]There is a considerable literature on the role of anger in aggression and other forms of criminal behavior (Fernandez & Johnson, 2016). Studies have focused on gender differences in crime (Campbell & Muncer, 2008), domestic violence (Dutton, 1995; Maiuro, Cahn, Vitaliano, Wagner, & Zegree, 1988), anger as a factor in treatment and recidivism (Klepfisz, O'Brien, & Daffern, 2014; Reid, Beauregard, Fedina, & Frith, 2014; Roberton, Daffern, & Bucks, 2015), institutional misconduct (DeLisi et al., 2010), developmental trajectories of crime (Hawes et al., 2016; Vaughn, DeLisi, Beaver, Perron, & Abdon, 2012), and general strain theory (Jang & Rhodes, 2012; Scheuerman, 2013), but these studies usually did not focus on Intermittent Explosive Disorder or often even mention it.

violent versus non-violent offenders. However, IED was merely used as a covariate and was not the focus of the study (Stefanska et al., 2015). For all intents and purposes, little is known about IED in a criminological context among criminal justice system clients.

The present study

By its very definition, IED is an important clinical disorder with explicit linkages to criminal offending; however, the construct has been largely overlooked by researchers. The current study seeks to examine the prevalence and correlates of IED in a population of federal correctional clients in the United States and examine its association with diverse forms of serious and pathological forms of criminal offending.

Method

Participants and procedures

The current study was based on archival data from the total population of 865 active clients in a federal probation jurisdiction in the Midwestern United States (two clients had incomplete data thus the analytical sample is 863). All clients were on supervised release after a term of supervision in the Bureau of Prisons. The sample was 84% male and 16% female. The preponderance (79.4%) of clients were white, 20.6% were African American. 92% were non-Hispanic and 8% are Hispanic and the mean age was 44 years. The most prevalent conviction offenses were distribution of methamphetamine (35%), felon in possession of firearm (13%), bank fraud, money laundering, and/or identity theft (13%), distribution of cocaine base (crack) (12%), possession or manufacturing of child pornography (6.5%), distribution of marijuana (6%), use of firearm during a drug trafficking offense (4.5%), and distribution of cocaine (3.6%).

The clients in this population had diverse but generally extensive criminal careers. Several parameters of the criminal career were examined and their descriptive statistics appear here: age of arrest onset ($\bar{x}$= 23.57, SD = 12.46, range = 6–78), juvenile arrests or police contacts ($\bar{x}$= 2.09, SD = 4.93, range = 0–59), juvenile confinements ($\bar{x}$ = .26, SD = .75, range = 0–7), total arrest charges ($\bar{x}$ = 14.31, SD = 14.75, range = 1–97), total convictions ($\bar{x}$= 8.51, SD = 8.26, range = 1–67), total prison sentences ($\bar{x}$ = 2.33, SD = 2.06, range = 1–16), probation revocations ($\bar{x}$= .67, SD = 1.20, range = 0–12), and parole revocations ($\bar{x}$ = .13, SD = .64, range = 0–8). Although federal offenders were primarily under supervision for drug, firearm, or child pornography offenses, their antisocial careers were comparable to other serious offenders shown in prior studies (DeLisi, 2016; DeLisi & Piquero, 2011; Jennings, Piquero, Rocque, & Farrington, 2015; Jennings, Rocque, Fox, Piquero, & Farrington, 2016; Piquero, Jennings, & Barnes, 2012; Vaughn, DeLisi, Beaver, & Howard, 2009).

Data collection occurred via two procedures. First, all data in the client's Probation/Pretrial Services Automated Case Tracking System (PACTS) file were electronically extracted and converted to an Excel spreadsheet. PACTS is a case management platform used in all 94 federal districts to track federal defendants and offenders. This electronic extraction contained information on 110 variables including demographics, case information, conditions, federal post-conviction risk assessment (PCRA) and assorted risks, criminal history indices, and other documents relevant to the client's social and criminal history.

Second, information on 108 additional variables was manually collected by the senior author. These variables were extracted from presentence reports (PSR), offender dossiers from the Bureau of Prisons, local, state, and national criminal histories, confidential psychological and psychiatric reports, treatment reports, and other relevant documents located in PACTS. The additional variables included conviction offense, measures of juvenile and criminal history, substance abuse history, onset, and diagnoses, personality disorders, criminality, victimization and abuse history, adverse childhood experiences, socioeconomic indicators, and summary measures of activity and misconduct during Bureau of Prisons confinement. These variables were coded and entered into the Excel spreadsheet. Upon completion, the data were transferred into Stata/IC 12.1 for data analyses.

Measures

Intermittent Explosive Disorder: IED was measured based on secondary diagnostic information from psychological reports in the offender's file and the client's PSR where there was evidence that the offender exhibited symptoms of the disorder or had received a formal lifetime diagnosis. IED was coded on a 3-point scale with no evidence/no symptoms = 0, some evidence/symptoms of IED but not enough for a formal diagnosis = 1, and definite evidence evidenced by a formal diagnosis = 2. The lifetime prevalence of IED ($\bar{x}$ = .06, SD = .33) was 3.6% (n = 31) with nine clients displaying lifetime symptoms of IED (1%), and 22 clients having a formal lifetime diagnosis (2.6%). Most—96.4%—clients had no evidence of IED in their psychiatric history.

Covariates: Seven additional covariates were included in the Poisson or negative binomial regression models. Lifetime diagnoses for Oppositional Defiant Disorder ($\bar{x}$ = .25, SD = .65), Conduct Disorder ($\bar{x}$ = .41, SD = .80), and Antisocial Personality Disorder ($\bar{x}$= .54, SD = .86). Formal prior diagnoses were based official psychological and psychiatric reports in the client's PACTS. All

disorders were scored on a 3-point scale with no symptoms = 0, symptoms but not enough for diagnosis = 1, met diagnostic criteria = 2. It is important to control for other psychiatric conditions that also produce antisocial behavioral responses (Ahmed et al., 2010; Coccaro, 2010, 2011; Coccaro et al., 1998; Felthous et al., 1991; Siever, 2008) to provide the most conservative test of the predictive validity of IED. It is additionally important to control for other psychiatric conditions that are significantly associated with antisocial behavior and criminal careers because IED is significantly comorbid with Antisocial Personality Disorder (Kessler et al., 2006; Murray-Close, Ostrov, Nelson, Crick, & Coccaro, 2010). Age of first onset ($\overline{x}$ = 23.57, SD = 12.46, range = 6–78), sex (female = 0; male = 1), race (white = 0; black = 1), and age ($\overline{x}$ = 43.67, SD = 11.47, range = 21–81) were also included as controls given their association with serious criminal offending (DeLisi & Piquero, 2011; Jennings et al., 2016; Piquero et al., 2012).

Dependent variables

Two types of dependent variables and analytical techniques were used. In the Poisson and negative binomial regression models, counts for arrests for murder ($\overline{x}$ = .02, SD = .15, range = 0–2), attempted murder ($\overline{x}$ = .19, SD = .69, range = 0–7), interference with police ($\overline{x}$ = .73, SD = 1.46, range = 0–13), aggravated assault ($\overline{x}$ = .61, SD = 1.54, range = 0–14), simple assault ($\overline{x}$ = .57, SD = 1.42, range = 0–16), and domestic assault ($\overline{x}$ = .73, SD = 1.63, range = 0–13) were regressed on the covariates. Goodness-of-fit diagnostics were performed on all regression models. The Poisson specification was appropriate for murder arrest charges, but due to overdispersion in the counts for attempted murder (likelihood-ratio test of α: $\chi^2 = 55.75$, $p < .001$), interference with police (likelihood-ratio test of α: $\chi^2 = 108.16$, $p < .001$), aggravated assault (likelihood-ratio test of α: $\chi^2 = 143.53$, $p < .001$), simple assault (likelihood-ratio test of α: $\chi^2 = 148.07$, $p < .001$), and domestic assault (likelihood-ratio test of α: $\chi^2 = 377.6$, $p < .001$), negative binomial regression was used. In the epidemiological tables, two measures were created to capture those at the 90th percentile or above on career arrest charges and career assault charges.

Results

Zero-order correlations with psychiatric conditions, criminality indicators, and criminal careers

As shown in Table 1, IED was significantly correlated with an array of psychiatric conditions, criminality indicators, and criminal career parameters. Zero-order correlations were significant between IED and ODD ($r = .18$, $p < .05$), CD ($r = .21$, $p < .05$), ADHD ($r = .10$, $p < .05$), and ASPD ($r = .27$, $p < .05$). IED was also significantly correlated with having sustained a traumatic brain injury ($r = .10$, $p < .05$), having sustained gunshot injury ($r = .18$, $p < .05$), having sustained stabbing

Table 1. Zero-order correlations between IED and psychiatric conditions, criminality indicators, substance dependence, and criminal careers.

Variable	Zero-Order Correlation with IED
Psychiatric Conditions	
Oppositional Defiant Disorder	.18*
Conduct Disorder	.21*
ADHD	.10*
Antisocial Personality Disorder	.27*
Traumatic Brain Injury	.10*
Self-Mutilation	.01
Suicidal Ideation	−.01
Suicide Attempts	.02
Generalized Anxiety Disorder	.04
PTSD	.03
Criminality Indicators	
Gunshot Wounds	.18*
Stab Wounds	.15*
Tattoos	.04
Gang Activity	.07*
Aliases	.12*
Homicidal Ideation	.33*
Homicidal Statements During Crime	.30*
Substance Dependence	
Cannabis Dependence	.13*
Cocaine Dependence	.01
Methamphetamine Dependence	−.01
Opiate Dependence	−.02
Alcohol Dependence	.15*
Criminal Careers	
Age of First Arrest	−.11*
Juvenile Police Contacts	.10*
Juvenile Commitments	.09*
Total Arrest Charges	.31*
Total Convictions	.29*
Total Prison Commitments	.13*
Probation Revocations	.12*
Parole Revocations	.04
Dismissed Charges	.29*
Murder	.12*
Attempted Murder	.20*
Armed Robbery	.02
Gun Possession	.21*
Kidnapping	.02
Rape/Sexual Abuse	.01
Robbery	.18*
Aggravated Assault	.42*
Simple Assault	.47*
Domestic Assault	.35*
Interference with Police	.34*
Burglary	.10*
Auto Theft	.03
Theft	.02
Public Intoxication	.18*
Escape	.05
Drug Sales/Trafficking	.02
Drug Possession	.11*
OWI/DUI	.03
Traffic Charges	.10*
Habitual Traffic Offender	.06

*p < .05

injury ($r = .15$, $p < .05$), gang activity ($r = .07$, $p < .05$), use of aliases ($r = .12$, $p < .05$), homicidal ideation ($r = .33$, $p < .05$), and making homicidal statements during the commission of a crime ($r = .30$, $p < .05$). IED was significantly correlated with Cannabis Dependence ($r = .13$, $p < .05$) and Alcohol Dependence ($r = .15$, $p < .05$).

In terms of the criminal career, IED was significantly correlated with arrest onset ($r = -.11$, $p < .05$), juvenile police contacts ($r = .10$, $p < .05$), juvenile commitments to a confinement facility ($r = .09$, $p < .05$), total arrest charges ($r = .31$, $p < .05$), total convictions ($r = .29$, $p < .05$), total prison commitments ($r = .13$, $p < .05$), probation revocations ($r = .12$, $p < .05$), and dismissed charges ($r = .29$, $p < .05$). IED was significantly correlated with a multitude of arrest charges for diverse crimes including murder ($r = .12$, $p < .05$), attempted murder ($r = .20$, $p < .05$), gun possession ($r = .21$, $p < .05$), robbery ($r = .18$, $p < .05$), aggravated assault ($r = .42$, $p < .05$), simple assault ($r = .47$, $p < .05$), domestic assault ($r = .35$, $p < .05$), interference with police ($r = .34$, $p < .05$), burglary ($r = .10$, $p < .05$), public intoxication ($r = .18$, $p < .05$), drug possession ($r = .11$, $p < .05$), and traffic violations ($r = .10$, $p < .05$).

Poisson/negative binomial regression models for murder, attempted murder, and interference with police

As shown in Table 2, IED was significantly associated with murder ($b = .681$, $z = 2.11$, $p < .05$), attempted murder ($b = .348$, $z = 2.71$, $p < .01$), and interference with police ($b = .488$, $z = 5.87$, $p < .001$). These effects withstood controls for three behavioral disorders (ODD, CD, and ASPD), arrest onset, sex, race, and age. Among the other covariates, arrest onset was negatively associated with murder and age was positively associated with murder. For the attempted murder model, ASPD, race, and arrest onset (inverse effect) were significant. For the interference with police model, additionally significant covariates were Antisocial Personality Disorder, arrest onset, and race.

Negative binomial regression models for aggravated assault, simple assault, and domestic assault

As shown in Table 3, IED was significantly associated with aggravated assault ($b = .591$, $z = 4.95$, $p < .001$), simple assault ($b = .902$, $z = 6.84$, $p < .001$), and domestic assault ($b = .661$, $z = 5.39$, $p < .001$). These effects withstood powerful covariates many of which were also significantly associated with various forms of assault. ASPD and age of first arrest were also significantly associated with all three forms of assault. In addition, age was positively associated with aggravated assault, race was positively associated with simple assault and domestic assault, males were more likely to perpetrate domestic assault, and clients with CD were less likely to perpetrate domestic assault.

Epidemiological table for 90th percentile career arrest charges

As shown in Figure 1, the odds of being a chronic offender were significantly associated with IED. For clients without symptoms of IED, the odds of being in the 90th percentile on the career arrest charges distribution was 7.7%. For those with symptoms of IED, the odds were 80% and for those with an IED diagnosis, the odds were 175%. The test of homogeneity indicated that the odds of being in the 90th percentile of career arrest charges were not equal across IED status ($\chi^2 = 78.25$, $p < .0001$) and the score test for trend of odds indicated the significant positive effect of IED status on chronic arrest charges ($\chi^2 = 77.68$, $p < .0001$).

Epidemiological table for 90th percentile assault-oriented arrest charges

As shown in Figure 2, the odds of being a chronic offender for assault-oriented arrest charges were strongly associated with IED. For clients without symptoms of IED, the odds of being in the 90th percentile for assault-oriented charges were 9.8%. For those with symptoms of

Table 2. Poisson/Negative binomial regression models for murder, attempted murder, and interference with police.

Variable	Metric regression coefficient	Robust SE	z-score	Metric regression coefficient	Robust SE	z-score	Metric regression coefficient	Robust SE	vz-score
Intermittent Explosive Disorder	.681	.322	2.11*	.348	.128	2.71**	.488	.083	5.87***
Antisocial Personality Disorder	−.426	1.01	−0.42	1.00	.205	4.89***	.651	.098	6.64***
Conduct Disorder	1.29	1.04	1.24	.243	.179	1.36	−.174	.098	−1.78
Oppositional Defiant Disorder	−.051	.299	−0.17	−.168	.152	−1.11	−.043	.079	−0.55
Arrest Onset	−.086	.039	−2.17*	−.049	.019	−2.63**	−.071	.010	−6.77***
Sex	−.644	1.14	−0.56	.796	.735	1.08	.055	.210	0.26
Race	.741	.503	1.47	.808	.245	3.30***	.667	.125	5.33***
Age	.070	.022	3.23***	.022	.011	2.04*	.006	.006	0.90
Wald χ^2	84.51***			216.29***			346.38***		

*p < .05, **p < .01, ***p < .001

Table 3. Negative binomial regression models for aggravated assault, simple assault, and domestic assault.

Variable	Metric regression coefficient	Robust SE	z-score	Metric regression coefficient	Robust SE	z-score	Metric regression coefficient	Robust SE	z-score
Intermittent Explosive Disorder	.591	.119	4.95***	.902	.132	6.84***	.661	.123	5.39***
Antisocial Personality Disorder	.951	.126	7.55***	.417	.123	3.40**	.583	.108	5.41***
Conduct Disorder	.041	.124	0.33	.130	.128	1.01	−.319	.122	−2.61**
Oppositional Defiant Disorder	.023	.095	0.25	−.082	.105	−0.79	−.036	.118	−0.31
Arrest Onset	−.055	.015	−3.69***	−.075	.013	−5.78***	−.048	.010	−4.81***
Sex	.518	.325	1.59	−.124	.242	−0.51	.546	.240	2.27*
Race	.124	.141	0.88	.364	.147	2.48*	.532	.173	3.07**
Age	.015	.007	2.11*	−.003	.007	−0.39	.014	.008	1.75
Wald χ^2	296.80***			262.00***			208.11***		

*p < .05, **p < .01, ***p < .001

IED the odds were 200% and for those with an IED diagnosis, the odds were 1,000%. The test of homogeneity indicated that the odds of being in the 90th percentile of assault-oriented charges were not equal across IED status ($\chi^2 = 167.46$, $p < .0001$) and the score test for trend of odds indicated the significant positive effect of IED status on chronic assault-oriented arrest charges ($\chi^2 = 165.23$, $p < .0001$).

Discussion

The *DSM-5* criteria for IED are a veritable recipe for serious antisocial behavior. These include recurrent outbursts of verbal aggression or physical aggression, aggressive behavior that is grossly disproportionate to the underlying precipitant, outbursts that are not premeditated and serve no premeditated purpose, and outbursts that cause distress or impairment in functioning. Even when controlling for serious behavioral disorders, age of arrest onset, and demographic characteristics, IED was significantly associated with a mélange of violent crime and chronic/sustained involvement in total arrest charges and assault-oriented charges. In other words, the *DSM-5* criteria are consistent with the manifest severe criminal acts among federal correctional clients.

Several themes drive the current discussion. First, at the bivariate level, IED is significantly correlated with a multitude of psychiatric and criminological constructs. There are significant associations between IED and allied behavioral disorders yet as the negative binomial regression models indicated IED withstood powerful controls for ODD, CD, and ASPD. Although the zero-order correlations cannot reveal temporal associations between variables, clients with IED were also frequently those who had been stabbed, who had been shot, and who had incurred traumatic brain injury. This makes perfect

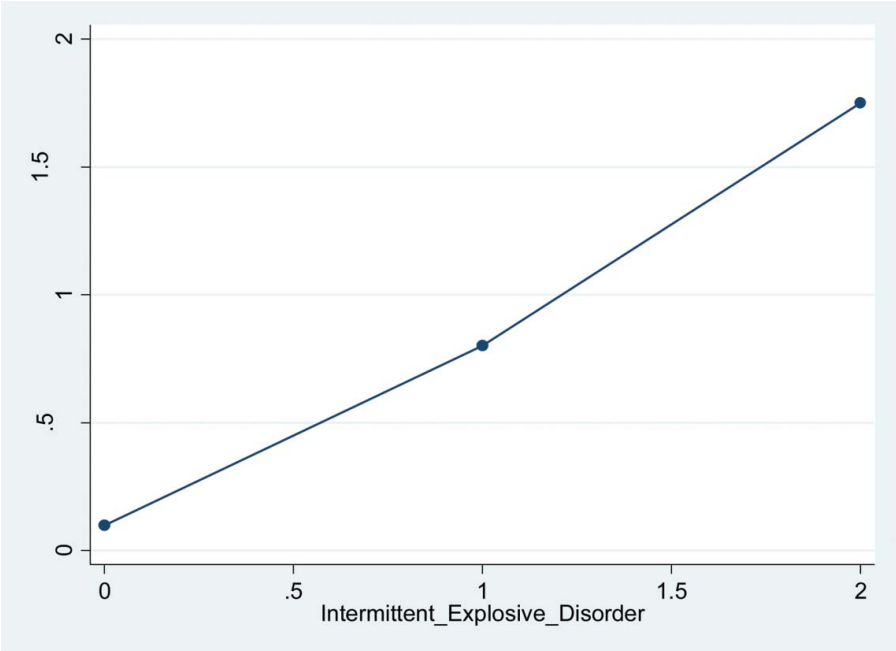

Figure 1. Epidemiological table for 90th percentile on career arrest charges.

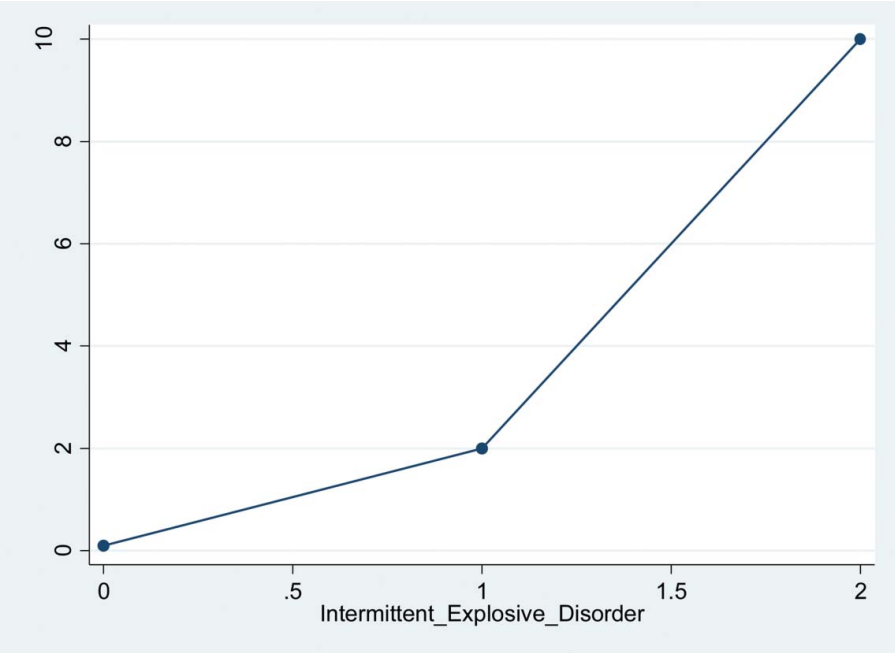

Figure 2. Epidemiological table for 90th percentile on career assault charges.

conceptual sense as individuals who present with the negative behavioral features of IED evoke aggression and interpersonal violence from others. Given the correlations between IED and other criminality indicators, such as aliases and gang activity, and the slew of crimes and criminal justice system involvements, it would seem that clients with IED evoke many opportunities to engage in violence.

Second, at the multivariate level, it is clear that IED exerts unique variance for serious crimes above and beyond the associations between other serious behavioral disorders, arrest onset, and demographic characteristics. IED is not just part and parcel of CD, ADHD, or ASPD, but instead captures offenders whose arrest records are disproportionately comprised of offenses suggesting a bellicose, reactive, unstable behavioral repertoire. For instance, the mean assault-related charges among clients who displayed no evidence of IED were 1.5 charges. Among those with symptoms of IED, the mean assault-related charges were 8.8 and among those with an IED diagnoses the mean was 12.7. Put another way, clients with the disorder had nearly 8.5 times more arrest charges on average for assault-related crimes than clients without the disorder. Thus, the qualitative blend of offenses in the criminal history of an offender with IED will contain a disproportionate number of assault charges across contexts (e.g., bar fights, domestic battery, and assaults on police).

Third, the current findings have practical application for practitioners who supervise correctional clients. Offenders who have been diagnosed with IED are likely to have more extensive criminal histories, and are disproportionately likely to have arrest charges for more violent offenses. Given the association between the disorder and various forms of assault and physical noncompliance with police (e.g., the interference with police charge), correctional staff must be vigilant when interacting with them. A practical approach to enhancing the safety of officers who supervise defendants and offenders with IED diagnosis is to require at least two officers partner on all field contacts. Another advisable course is to ensure the district's mental health specialist, supervisor and contract or non-contract mental health treatment professional are consulted regularly regarding the status and needs of the case. Given the heightened propensity for violence to be perpetrated by offenders and defendants with IED, it is imperative that parole and probation systems consider this condition as an important marker for future violence and develop individual case plans accordingly. Balancing additional officer resources and contacts in the community with appropriate dosage and frequency of mental health resources for these cases offers the best possible outcomes. There is evidence that Intermittent Explosive Disorder symptoms can be managed with antidepressants or mood stabilizing medication (McElroy, Soutullo, Beckman, Taylor, & Keck, 1998; Olvera, 2002). There is also evidence that cognitive behavioral therapy can be effective at reducing aggression, reducing anger and hostility, and improving anger management (McCloskey, Noblett, Deffenbacher, Gollan, & Coccaro, 2008).

Fourth, the exceptionality or rarity of IED offers potential for theoretical integration and development. The lifetime prevalence of symptoms and diagnosis was 3.6% which is statistically rare and substantively similar to the prevalence of life-course-persistent antisocial conduct articulated in Moffitt's (1993) influential developmental taxonomy and Vaughn and colleagues' severe 5% hypothesis (Vaughn et al., 2011; Vaughn, Salas-Wright, DeLisi, & Maynard, 2014). Both theories describe a small segment of offenders (overwhelmingly male with an assortment of self-regulation, emotional regulation, and neurocognitive deficits) whose externalizing behaviors are dramatically discrepant from peers and significantly higher than other delinquents and criminal offenders during childhood, during adolescence, and throughout adulthood. Neither Moffitt nor Vaughn et al.'s conceptual model explicitly cover IED, but the criminal career metrics of offenders with IED are commensurate with life-course-persistent specifications. Moreover, as the multivariate models showed, IED was not merely an adjunct of more common behavioral disorders including ODD, CD, ASPD, and ADHD. In this way, IED could be a useful supplement to theories of pathological criminality that typify offenders that have particularly pernicious anger-control problems and recurrent displays of explosive aggression.

Similarly, although scholars have been slow to study IED, it is important to acknowledge that anger, hostility, and poor temper control are critical components of mainstream theories including developmental pathways theory (Loeber & Hay, 1997), general strain theory (Agnew, 1992), self-control theory (Gottfredson & Hirschi, 1990), and temperament theory (DeLisi & Vaughn, 2014). It is understood that individuals who have difficulty regulating their hot forms of negative emotionality, principally anger and hostility, are at increased risk for externalizing and antisocial behaviors (Baglivio, Wolff, DeLisi, Vaughn, & Piquero, 2016; Birkley & Eckhardt, 2015; Bowes & McMurran, 2013; Chereji, Pintea, & David, 2012; Jones, 2017; Scarpa & Raine, 1997). It is largely unknown whether those who react poorly to strain, or who cannot stifle their temper, or who are hot-headed in their disposition would meet diagnostic criteria for IED. Thus, by expanding the criminological scope to include IED, scholars could more clearly understand clinically significant expressions of explosive anger.

There are several limitations to the current study that should be noted. First, the archival data are cross-sectional thus we were unable to examine the timing of the IED symptoms or diagnosis and the temporal location of IED symptoms relative to their criminal career.[3] Individuals with IED perpetrate acts of aggression for a variety of reasons. For instance, McElroy et al. (1998) found that all of their 27 cases of IED reported aggressive impulses immediately prior to their aggressive acts. However, the affective reactions to these aggressive acts were varied. 88% of their cases experienced tension/distress, 75% experienced relief, and 48% experienced pleasure after perpetrating aggression. Longitudinal data would allow us to examine criminal events and isolate the affective valence that is associated with specific forms of aggression.

A second and related limitation is the inability to evaluate the consistency with which clinicians noticed IED symptoms among these offenders and formally diagnosed them with the condition. This is an inherent limitation of archival records. One of the main themes in studies of IED centers on diagnostic inconsistency and other problems associated with assessing the condition among clinicians (see Coccaro et al., 1998; Felthous et al., 1991; McCloskey et al., 2006; Monopolis & Lion, 1983). However, it appears that clinicians were quite conservative in identifying the symptoms of IED (prevalence of just 1%) and formally diagnosing offenders with IED (prevalence of just 2.6%). These prevalence estimates are significantly lower than the broad (6.9%) and narrow (5.4%) overall prevalence estimates of studies conducted in the United States as reviewed by Coccaro (2012).

Third, the current study employed official arrest charges which are obviously a sampling of the true incidence of offending shown with offender self-reported data (Biderman & Reiss, 1967; DeLisi et al., 2016; Pollock, Menard, Elliott, & Huizinga, 2015; Thornberry & Krohn, 2000). Future research should examine the self-reported offending of clients with and without IED to quantify explosive, assaultive events that individuals perpetrate that nevertheless do not result in arrest. Self-reported data would also permit empirical study of the extent and magnitude of the symptoms of the disorder. For instance, the maximum values for aggravated assault, simple assault, and domestic assault were 14, 16, and 13,

[3]It is important to recognize that the more severe and pathological the behavior, the more enduring its developmental course and less likely it is to remit. A well-known study that substantiates this is Caspi, Elder, and Bem (1987)) 30-year follow-up of the participants in the Berkeley Guidance Study. Children with severe temper tantrums evinced continuity in explosive anger across life, and this behavioral deficit significantly reduced their functioning. According to Caspi et al. (1987), p. 313), "Children with a stable pattern of temper tantrums in late childhood experiences difficulties across many life tasks. The early tendency toward explosive, under controlled behavior was evoked in new roles and settings, especially those involving subordination (in educational, military, and work settings) and in situations that required negotiating interpersonal conflicts (such as marriage and parenting)." Although not a study of IED per se, it is symbolically fitting that Caspi et al. referred to the temper tantrums as "explosive."

respectively. If an offender amassed this many official arrests, it is probable that the prevalence of violent outbursts is substantially greater, and likely causes dysfunction in relationship, work, and social domains (Fernandez & Johnson, 2016).

To conclude, IED is a relatively rare psychiatric condition that has clear and evident application to criminology. The relatively low prevalence of IED could be attributable to the fact that it is conceptually similar to ASPD and Borderline Personality Disorder, two conditions that also often contain acts of impulsive aggression. Indeed, the American Psychiatric Association explicitly states that IED should not be diagnosed if the behaviors are better accounted for by ASPD and BPD. We suspect that some clinicians interpret early-onset aggression and physical assaults (see Ahmed et al., 2010) as part and parcel of a serious and chronic criminal career that lends itself more to CD and ASPD. Although just 3.6% of federal correctional clients in the current sample displayed symptoms or met diagnostic criteria for the disorder, these individuals were significantly likely to perpetrate serious criminal violence including murder, attempted murder, interference with police, and three forms of assault, to be habitual offenders, and to be chronically violent. We urge researchers to study IED and its linkages to violent criminal careers by examining case-level data in the pursuit of policy improvements to enhance officer and public safety.

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