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DSM-5 intermittent explosive disorder: Relationship with Disruptive Mood Dysregulation Disorder

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ABSTRACT

Objective: This study was designed to estimate how many adults with DSM-5 Intermittent Explosive Disorder (IED) would also meet diagnostic criteria for Disruptive Mood Dysregulation Disorder (DMDD). This was done by examining how many individuals with IED would meet the DMDD criterion of being persistently angry in between impulsive aggressive outbursts.
Methods: The first one-hundred study participants diagnosed with DSM-5 IED in our clinical research program were included in this study. Two questions were added to the IED module from the Structured Clinical Interview for DSM-5 Disorders (SCID) inquiring about the duration of anger in between impulsive aggressive outbursts in IED study participants. Data regarding aggression, impulsivity, anger expression, and related dysphoric variables were also collected.
Results: The proportion of time spent as angry in between impulsive aggressive outbursts was <50% of the time (~35%) for the vast majority (92%) of study participants with DSM-5 IED. Despite this, persistently-angry (i.e., angry >50% time in between outbursts) IED study participants displayed no differences from not-persistently-angry IED study participants in dysphoric and aggression/impulsivity related variables.
Conclusions: These data indicate that inter-outburst anger in those with IED is relatively brief and that such individuals do not generally display the kind of persistent anger that is a diagnostic feature of DMDD.

1. Introduction

Currently, only two disorders in the DSM-5 focus primarily on anger and aggression - Intermittent Explosive Disorder (IED; [1]) and Disruptive Mood Dysregulation Disorder (DMDD; [2]). Examination of the two criteria sets reveals that DMDD is essentially the same as IED with only a few differences, with the presence of persistent anger in DMDD (but not IED) being the most important. Other differences include the requirement of at least an average of three, rather than two, aggressive outbursts per week and age of onset before age ten years for DMDD compared with IED, and the requirement that DMDD cannot be diagnosed for the first time after the age of eighteen.

Persistent anger can be defined, operationally, as anger lasting for no <50% of the time in between separate impulsive aggressive outbursts. Because the proposal that persistent anger could be a key diagnostic feature of disorders of impulsive aggression did not emerge until the development of DMDD [2], there has been no data regarding the presence of persistent anger in individuals with IED until now. In order to do so, our group added two questions to our diagnostic interview schedules that inquired about the percentage of time, in between impulsive aggressive outbursts, IED individuals felt angry and how much time it took for each to return to their baseline level of anger.

In this study, we report on the phenomenon of persistent anger in those with DSM-5 IED. Based on our clinical experience studying IED we hypothesized that the majority of study participants with DSM-5 IED would not have persistent anger in between impulsive aggressive outbursts, that such individuals would return to baseline levels of anger sooner than those with persistent anger, and that there would be differences between IED study participants with and without persistent anger.

2. Method

2.1. Participants

This study involved the first 100 individuals diagnosed as having DSM-5 IED using the Structured Clinical Interview for DSM-5 Diagnoses (SCID; [3]). Participants were recruited through public service announcements, newspaper, and other media, advertisements seeking out individuals who reported psychosocial difficulty related to anger and aggression. This study was approved by our Committee for the

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Protection of Human Subjects (IRB) and signed, written, informed consent from study participants.

2.2. Diagnostic assessment

Syndromal psychiatric, and personality, disorder diagnoses were made according to DSM-5 criteria [4]. Diagnoses were made using information from: (a) the Structured Clinical Interview for DSM Diagnoses (SCID-I; [3]) for syndromal (formerly Axis I) disorders and the Structured Interview for the Diagnosis of DSM Personality Disorder [5] for personality (formerly Axis II) disorders; (b) clinical interview by a research psychiatrist; and, (c) review of all other available clinical data. Research diagnostic interviews were conducted by individuals with a masters, or doctorate, degree in Clinical Psychology or in Social Work. All diagnostic raters went through a rigorous training program that included lectures on DSM diagnoses and rating systems, videos of expert raters conducting SCID/SIDP interviews, and practice interviews and ratings until the rater were deemed reliable with the trainer. This process resulted in good to excellent inter-rater reliabilities (mean kappa of 0.84 ± 0.05; range: 0.79 to 0.93) across anxiety, mood, substance use, and personality disorders; kappa for the diagnosis of IED was 0.90. Final diagnoses were assigned by team best-estimate consensus procedures involving research psychiatrists and clinical psychologists [6]. Finally, participants with a current history of a substance use disorder or a life history of bipolar disorder, schizophrenia (or other psychotic disorder), or mental retardation were excluded from study. This is because, by definition, IED participants cannot have such comorbidities.

2.3. Assessment of anger and persistent anger in IED study participants

Two items were added to the IED module of the DSM-5 SCID [3]. These items were worded as follows: (a) "Some people feel 'irritable and/or angry' for some time after a temper or aggressive outburst; do you ever feel that way? (If yes), for how long a period of time do you feel 'irritable or and/or angry'? and 'What percentage of the time (in between outbursts) would you say that you feel 'irritable and/or angry'?" and, (b) "After an outburst, how long does it take for you to get back to your 'usual state' (i.e., how you felt before your outburst)?" This information was recorded directly from the study participant.

2.4. Assessment of anger expression and dysphoria related variables

Anger expression was assessed using the Anger-In and Anger-Out subscales from the Speilberger State-Trait Anger and Expression of Anger (STAXI-2; [7]) assessment. Both subscales have eight items (e.g., Anger-In: "I boil inside"; Anger-Out: "I express my anger") scored on a four-point Likert scale (1 = Almost Never, 4 = Almost Always). In this sample, the alpha coefficients were 0.75 and 0.81, respectively. State depression and state anxiety were assessed with the Beck Depression Inventory-2 (BDI-2; [8]) and the Beck Anxiety Inventory (BAI; [9]), respectively.

2.5. Assessment of aggression and impulsivity

Aggression was assessed with the aggression scales of the Life History of Aggression (LHA; [10]) assessment and of the Buss Perry Aggression Questionnaire (BPAQ; [11]). LHA Aggression assesses history of actual aggressive behavior while the BPA assesses aggressive tendencies as a personality trait. LHA Aggression is a widely used five-item measure that quantitatively assesses one's life history of overt aggressive behavior (i.e., aggressive thoughts/urges are not counted). It is conducted as a semi-structured interview. Internal consistency ($\alpha = 0.87$), inter-rater reliability ($r = 0.94$), and test-retest reliability ($r = 0.80$) is good-to-excellent. BPA Aggression, also a widely used assessment of trait aggression, is composed of the BPA's Verbal Aggression and Physical Aggression subscales and has good psychometric properties. Impulsivity was assessed with the Life History of Impulsive Behavior (LHIB; [12]) and with the Barratt Impulsiveness Scale (BIS-11; [13]). The LHIB assesses history of actual impulsive behavior and is conceptually similar to the LHA). It includes 20 items regarding impulsive behavior and is scored on a five point ordinal scale (as is the LHA). The LHIB demonstrates good internal consistency ($\alpha = 0.96$) and test-retest reliability ($r = 0.88$).

2.6. Statistical analysis

Comparisons of between-group variables were performed by Chi-square and Mann-Whitney rank-sum tests because of the large difference in sample size between the groups ($n = 92$ vs. $n = 8$). A two-tailed alpha value of 0.05 was used to denote statistical significance for all analyses.

3. Results

3.1. Sample characteristics

Table 1 displays the diagnostic data, while Table 2 displays the demographic and functional characteristics, of the DSM-5 IED study participants. Most study participants (76%) had previous psychiatric history with treatment (54%) or history of behavioral disturbance (22%) which should have been evaluated and treated but was not.

3.2. Prevalence of inter-outburst anger

Only eight of the 100 IED study participants (8%) reported persistent anger for >50% of the time between individual IED impulsive aggressive outbursts. The mean percent of time spent as "angry/irritable" in between outbursts was significantly greater for the persistently-angry group (72.0 ± 11.7%) compared to the not-persistently angry (35.2 ± 15.0%; $z = 4.77$, $p < 0.001$). The duration of time spent as "angry/irritable", before returning to pre-outburst levels of "anger/irritability", was also significantly greater for the persistently angry group (112.8 ± 33.5 min vs. 62.7 ± minutes, $z = 2.97$, $p = 0.003$). The correlation between these two variables in the overall sample was statistically significant and moderately sized in magnitude (Spearman rho = 0.48, $p < 0.001$).

3.3. Characteristics of the persistently-angry participants

While the DSM-5 criteria set for Disruptive Mood Dysregulation Disorder (DMDD; [3]) precludes making a DMDD diagnosis for the first

Table 1
Syndromal and personality disorder diagnoses among IED study participants.

DSM-5 disorder	N (%)
Current syndromal disorders:	
Any depressive disorder	21 (21.0%)
Any anxiety disorder	20 (20.0%)
Any substance use disorder	0 (0.0%)
Stress and trauma disorders	17 (17.0%)
Obsessive-compulsive disorders	3 (3.0%)
Eating disorders	3 (3.0%)
Non-IED impulse control disorders	0 (0.0%)
Lifetime syndromal disorders:	
Any depressive disorder	53 (53.0%)
Any anxiety disorder	25 (25.0%)
Any substance use disorder	36 (36.0%)
Stress and trauma disorders	28 (28.0%)
Obsessive-compulsive disorders	3 (3.0%)
Eating disorders	10 (10.0%)
Non-IED impulse control disorders	3 (3.0%)
Personality disorders:	
Cluster A (odd)	13 (13.0%)
Cluster B (dramatic)	31 (31.0%)
Cluster C (anxious)	7 (7.0%)
PD-NOS	53 (53.0%)

Table 2
Demographic, functional, and psychometric data as function of persistent anger.

	All IED study participants ($N = 100$)	IED: persistently angry ($N = 8$)	IED: not-persistently angry ($N = 92$)	p^*
Demographic variables				
Age	36.2 ± 11.0	32.3 ± 10.2	36.6 ± 11.1	= 0.263[a]
Gender (% male)	52%	62.5%	51.1%	= 0.717[b]
Race (% white/%AA/% other)	23%/62%/15%	23/62/15	25/63/12	= 0.974[b]
SES score	34.1 ± 12.2	37.0 ± 12.0	33.8 ± 12.9	= 0.404[a]
Psychosocial function				
GAF score	59.7 ± 4.5	59.6 ± 4.1	59.8 ± 4.6	= 0.848[a]
Dysphoria related variables				
Anger expression in: STAXI	17.5 ± 4.4	16.4 ± 1.5	17.6 ± 4.6	= 0.623[a]
Anger expression out: STAXI	20.4 ± 5.3	19.0 ± 3.3	20.5 ± 5.4	= 0.545[a]
Depression: BDI	11.7 ± 9.8	10.7 ± 12.9	11.8 ± 9.6	= 0.597[a]
Anxiety: BAI	26.7 ± 6.0	28.6 ± 9.6	26.6 ± 5.5	= 0.919[a]
Aggression related variables				
Aggression: LHA	18.6 ± 4.0	19.6 ± 3.7	18.5 ± 4.0	= 0.365[a]
Aggression: BPA	49.7 ± 11.0	49.4 ± 12.9	49.7 ± 10.9	= 0.848[a]
Impulsivity: LHIB	50.8 ± 22.6	52.0 ± 22.8	50.7 ± 22.6	= 0.885[a]
Impulsivity: BIS-11	66.0 ± 10.5	62.6 ± 14.8	66.3 ± 10.1	= 0.584[a]

* *p* for "Persistently Angry" vs. "Not-Persistently Angry" using Mann-Whitney Rank-Sum (a), or Chi-Square (b), Tests.

time in individuals aged 18 or greater, each of the eight IED study participants in the persistently-angry group met the "D" criterion for DMDD (i.e., mood between temper outbursts in persistently irritable or angry most of the day, nearly every day, and is observable by others). That said, since only three participants had onset of impulsive aggressive outbursts before the age of ten years, only these three could have been diagnosed with DMDD in their childhood. In each of the remaining cases, age of onset of impulsive aggressive outbursts, sufficient to meet criteria for IED or DMDD, was greater than ten years of age (one at age 12, three at age 14, and one at age 16) and, thus, these could not have been given a retrospective diagnosis of DMDD.

3.4. Differences between persistently-angry and not-persistently-angry IED study participants

Table 2 displays demographic, functional, and relevant data for dysphoria variables and for aggression/impulsivity variables for study participants as a function of inter-episode anger. No significant differences in any of these variables were found as a function of belonging to the persistent-anger or non-persistent-anger group. Effect sizes of raw differences ranged from d = 0.03 to d = 0.38 [mean (sd) d = 0.23 ± 0.14]. In addition, no differences were noted in the distribution of syndromal/personality disorders between the groups.

4. Discussion

The results of this study strongly suggest that, while anger is a critical component of DSM-5 IED, the proportion of time spent as angry/irritable in between impulsive aggressive is <50% (i.e., ~35%) for the vast majority (92%) of those with DSM-5 IED. In addition, the time it took most of our IED study participants to reach baseline levels of anger/irritability is about 1 h, confirming earlier reports that the impulsive aggressive outbursts of those with IED are relatively short [14]. Most notable is that persistently-angry IED study participants displayed no significant differences from not-persistently-angry IED study participants in dysphoric and aggression/impulsivity related variables. While the persistently-angry IED study participant group was small in size, the average effect size of these differences was modest (d = 0.19 ± 0.14).

These findings are highly relevant to our understanding how DSM-5 IED compares with DSM-5 DMDD with respect to anger and irritability. While the presence of angry, impulsive, aggressive outbursts are key for the diagnosis of DSM-5 IED, the vast majority of those with IED spend less than two-fifths of their inter-outburst time in an angry/irritable state and return to baseline in about an hour. In contrast, and by definition, individuals with DMDD spend no <50%, and typically much more, of their inter-outburst time in an angry/irritable state. In our study, IED study participants with persistent anger/irritability reported that they spent about 75% of their inter-outburst interval as angry/irritable and reported a nearly 2 h period before return to baseline levels of anger/irritability. While eight persistently-angry study participants (8%) might have met DSM-5 criteria for DMDD in childhood, only three (3%) actually met criteria for a retrospective DSM-5 DMDD diagnosis; the remaining five (5%) participants in this group had an age of onset of impulsive aggressive outbursts between 12 and 16 years of age while a DMDD diagnosis requires age of onset to be no later than age ten.

Despite large, statistically significant, differences in anger/irritability variables (portion of time angry/irritable, time to return to baseline levels of anger/irritability), IED study participants with persistent-anger did not differ from those without persistent-anger in all relevant variables examined. While the former group was small in sample size, the presence of persistent-anger, in between impulsive aggressive outbursts, in DSM-5 IED study participants does not meaningfully discriminate the two groups.

It is tempting to speculate that the persistently-angry IED study participants would have met DSM-5 criteria for DMDD if they had been assessed during their childhood. While not possible to do in this study, it is likely that some proportion of those with DMDD in childhood would later meet DSM-5 criteria for IED when assessed after the age of ten. As currently conceptualized, DMDD is a mood disorder with frequent angry, impulsive aggressive outbursts in which there is a persistently angry/irritable dysphoric mood in between these outbursts. DMDD has also been shown to have important bio-behavioral correlates involving cortico-limbic abnormalities [15] similar to those observed in those with IED [16,17]. While IED has not been formally conceptualized as a mood disorder, it does exhibit abnormalities in terms of affect and affect regulation including intensity and lability of affect.

The strengths of this study include a prospective and consecutive case series of individuals diagnosed with DSM-5 IED, comprehensive assessment of other DSM-5 diagnoses, and the comprehensive assessment of relevant behavioral dimensions. Limitations include at least five issues. First, the lack of a contemporaneous group of individuals with DSM-5 DMDD which was not possible since our research group does not study children or adolescents. Second, the cross-sectional assessment of psychopathology, which was by design, but note that trait-related measures are not expected to change over time. Third, recruitment from the community, which was by necessity since there are no formal clinical programs assessing and treating individuals with

IED. That said, most of our study participants (76%) reported a history of formal psychiatric evaluation and treatment and/or a history of behavioral disturbance in which they or others thought they should have sought treatment, and as such may be similar to individuals that would have been recruited from a clinical setting. Fourth, the limited number of persistently-angry IED study participants, was small in size and a larger group could have rendered different results, though the effect sizes for the absolute differences between the groups were only small to medium in magnitude. Finally, while the primary way to assess the presence of "persistent anger" between aggressive outbursts is to directly ask the study participant, it is possible that a more detailed assessment of many individual outbursts would have led to a different result. Such an approach, however, would be onerous for study participants and not likely be meaningfully more accurate compared with asking participants about inter-outburst phenomena in general. First, direct observation of study participants during and after an outburst is not possible in the outpatient setting and second, usual diagnostic procedures, especially in a clinic setting, inquire about behavioral data in the same manner as performed in this study.

5. Conclusion

While anger is a critical component of DSM-5 IED, individuals with IED report being in an angry state for much <50% of the time in between impulsive aggressive outbursts. This is in contrast to individuals with DMDD for which persistent anger is a diagnostic feature. While a small number of these IED study participants reported spending much time in between outbursts in an angry state, these persistently angry individuals did not differ from non-persistently angry individuals on any variable examined. Finally, only a few IED study participants could have met criteria for DMDD suggesting that IED and DMDD, while related phenomenologically, likely differ from each other in terms of persistent inter-outburst anger.

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Disclosures

Dr. Coccaro reports being a consultant to and being on the Scientific Advisory Boards of Azevan Pharmaceuticals, Inc. and of Avanir Pharmaceuticals, Inc., and being a current recipient of a grant award from the NIMH. Dr. Lee reports being a recipient of a grant award from Azevan Pharmaceuticals, Inc., and from Avanir Pharmaceuticals, Inc.

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