Anger in psychological disorders: Prevalence, presentation, etiology and prognostic implications

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HIGHLIGHTS

- Anger and its variants e.g., irritability are highly prevalent in five DSM disorders.
- Anger is prognostically important in these disorders.
- Past research suggests differences in phenomenology and etiology of anger across disorders.
- Transdiagnostic views of anger consider cognitive processes, temporal dynamics, and neurochemistry.

ARTICLE INFO

ABSTRACT

Anger is present as a key criterion in five diagnoses within DSM-5: Intermittent Explosive Disorder, Oppositional Defiant Disorder, Disruptive Mood Dysregulation Disorder, Borderline Personality Disorder and Bipolar Disorder. This review amasses scientific literature demonstrating that within each of these disorders, anger is a central clinical feature that is highly prevalent and predictive of important outcomes. For each disorder, we also discuss the phenomenology and etiology of anger. Although models of anger have been quite distinct across these disorders, few empirical studies have truly tested whether anger stems from different etiological factors across these different conditions. We end with a discussion of transdiagnostic research that draws from cognitive psychology, affective science, and the neuroscience of anger, and that also fits with integrative approaches to treatment.

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1. Anger in five psychological disorders

This review covers five DSM-5 diagnoses in which anger is a key criterion: Intermittent Explosive Disorder, Oppositional Defiant Disorder, Disruptive Mood Dysregulation Disorder, Borderline Personality Disorder and Bipolar Disorder. For each disorder, we describe the prevalence of anger, the form of anger, and models of the etiology of anger. Where available, data are also presented on key outcomes that have been related to anger within the disorder. We then turn to a discussion of how the compartmentalized literature on anger within each of these disorders could be usefully consolidated under a transdiagnostic model of anger in psychopathology.

2. Conceptualization of anger

Anger has been described using different shades of meaning and emphasis, but there is little disagreement that it belongs in the realm of negative affect. Consistent with the cognitive-motivational view of emotions (Lazarus, 2000; Scherer, 2013), anger is tied to an appraisal of wrongdoing and an action tendency to counter/undo that wrongdoing in ways that may range from resistance to retaliation. Similar cognitive-motivational components have been identified in implicit lay perceptions of anger (Smedslund, 1993).

Anger, like fear and sadness, can be differentiated in terms of intensity and form. It can range "in intensity from irritation or annoyance to fury or rage" (Smith, 1994, p. 25). Anger can also assume the form of emotion, mood, or temperament: the first of these is a momentary episode, the second is relatively mild but prolonged, and the third implies a proneness to recurrent bouts of anger (Fernandez & Kerns, 2008). Thus, in the varied and nuanced vocabulary of anger, words such as rage and fury reflect the phasic bursts of anger, whereas irritability and irascibility imply anger that is ongoing or tonic; hostility, by contrast, is reserved for a pattern of frequent occurrence that suggests dispositional rather than situational anger (Buss, 1961; Ramírez & Andreu, 2006). As can be inferred, these different forms of anger are representable as unique configurations on basic dimensions such as frequency, duration, and intensity. Individuals also differ in the threshold and latency of their typical anger responses (Fernandez, Arevalo, Torralba, & Vargas, 2014).

Physiological accounts of anger are beyond the scope of this clinical review, though a few summary statements are in order. The Jamesian view of emotions as sensed bodily changes ushered in an era of search for autonomic correlates or anger. In his critical review of this history, Stemmler (2010) identified a somatovisceral physiology of anger in which alpha-adrenergic activation and blood pressure increases are coordinated to facilitate readiness to react. However, on the basis of meta-analytic evidence, he concluded that only on a subset of recordable variables could anger be differentiated from other emotions. The advent of fMRI has been greeted with more hope in finding a neural signature for anger. This too has turned out to be far more elusive than expected. An incisive meta-analysis of 15 years of neuroimaging research produced little evidence for the view that emotions such as anger are localized in specific brain sites (Lindquist, Wager, Kober, Bliss-Moreau, & Barrett, 2012). Rather, the results provided support for a psychological constructionist view of anger.

At the core of the psychological characterization of anger is the distinction between experience and expression (Spielberger, Reheiser, & Sydeman, 1995). The former refers to the person's subjective feelings, whereas the latter pertains to how anger is displayed or communicated. The expression of anger is an important factor in determining whether or not anger is pathological.

Two major "red flags" that anger expression has reached a pathological level are aggression which is physical or verbal behavior that is intended to hurt, and violence which is behavior that intentionally culminates in actual physical injury or damage. Though often taken as proxies for anger, aggression and violence can be instrumental behaviors (Card & Little, 2007; Day & Fernandez, 2015; Fontaine, 2007) as in armed robbery which need not involve anger. Factor analytic research provides evidence for the separability of affective and behavioral aspects of anger (e,g., Burke, Hipwell, & Loeber, 2010). As argued by Averill (1983), anger, whether functional or dysfunctional, can certainly occur in the absence of aggressive or violent behavior and vice versa. This is important clinically because many clients present with difficulties in coping with felt emotion that is not overtly expressed. Within this review, we focus on anger rather than violence, although violence receives mention in instances where it is preceded by anger.

Motivational theories characterize anger as an approach emotion (Carver & Harmon-Jones, 2009). That is, anger is often triggered by thwarting of attempts to attain goals. This contrasts with fear and anxiety, which tend to be triggered by threatening stimuli that lead to avoidance. Consistent with these motivational roots, anger impels efforts to counter barriers to goal attainment. With appropriate expression, then, anger may have functional benefits in removing barriers to goal attainment. Nonetheless, some individuals have difficulty expressing anger appropriately and remain thwarted in their attempts to address these barriers. This may be a particular concern for those with passive-aggressive tendencies (Morey, Hopwood, & Klein, 2007). Certainly, there is a wide spectrum of anger expression styles, each with its own intended outcomes.

3. Anger as an important predictor of outcomes

A growing literature points toward adaptive outcomes associated with appropriate levels of anger in certain contexts. For example, faced with difficult negotiation tasks, people tend to prefer activities that increase their anger, and this in turn can enhance their performance (Tamir, Mitchell, & Gross, 2008). Hence there may be important ways in which anger is functional, when it is present at the right levels, with the "right" skills for expression, in the right context.

Although deciding when anger should be considered pathological remains a matter of some clinical judgment, several dimensions are worth considering, including context appropriateness, frequency, intensity, and duration. Physically aggressive or violent anger would typically

be regarded as aberrant or problematic, even when legal consequences have not arisen. It behooves the clinician to evaluate individual differences on these dimensions within the bounds of normative cultural expectations.

Considerable literature highlights the central role of anger in a range of social, family, and medical problems, thus providing support for the relevance of evaluating anger carefully as a potential source of dysfunction. For example, path analysis points to a significant contribution of anger and hostility to marital distress (Renshaw, Blais, & Smith, 2010). Irritability appears to be a predictor of depression in the long term (e.g., Brotman et al., 2006; Stringaris, Cohen, Pine, & Leibenluft, 2009) and even suicidality (e.g., Pickles et al., 2010). Cardiovascular disease is now known to be exacerbated by maladaptive anger (Smith, Glazer, Ruiz, & Gallo, 2004; Williams, 2010). Those who endorse anger suppression complain of relatively higher pain intensity and even pain-related disability (Bruehl, Liu, Burns, Chont, & Jamison, 2012). In summary, dysfunctional levels of anger are associated robustly with a variety of adverse mental and physical health consequences as well as interpersonal conflict and aggression.

In the following sections, we review anger across a set of DSM-5 disorders. For each disorder, we review the centrality of anger in diagnostic criteria, as well as research on how common anger is within the given disorder, and the phenomenology of how anger is expressed or clinically presented. We note outcomes that have been related to anger for that syndrome, and then we discuss the conceptual and empirical approaches that have been applied to understanding anger within that diagnosis.

4. Intermittent Explosive Disorder

Of the DSM-5 diagnoses, Intermittent Explosive Disorder (IED) is the one that is quintessentially related to anger, in that it is defined by recurrent angry/impulsive aggressive episodes that are disproportionate to provocation. Between these outbursts, the person may experience less serious instances of angry/impulsive aggression. The source of perceived provocation can be a close intimate or an associate. Only aggressive behavior related to anger or impulse, as opposed to aggression in the pursuit of secondary gain such as money or power, is considered in the diagnostic criteria for IED.

Like DSM criteria for pyromania and other impulse control disorders, the diagnostic criteria for IED specify a sudden urge to engage in the behavior in question. If resisted, this urge often leads to mounting tension; acting upon the urge provides relief but is likely to be followed by regret (Berner, 2007). In DSM-III, those with IED were cast as mild mannered individuals who occasionally become enraged, with the anger described as sudden, out of control and almost like a seizure; this has been described as a "Jekyll and Hyde" presentation (Coccaro, Lee, & McCloskey, 2014b). DSM IV and 5 moved away from such a depiction, although the criteria continue to emphasize the sporadic rather than chronic nature of the anger.

Researchers have conducted studies of the nature of anger and aggression within IED. Taxometric methods validate IED as a distinct category demarcated by more frequent and disproportionate aggression when compared to healthy controls (Ahmed, Green, McCloskey, & Berman, 2010).

Nonetheless, there is substantial heterogeneity in the temporal dynamics of aggression observed. In one study of 354 participants who met the DSM-5 criteria for IED, 70% displayed high intensity and high frequency of aggressive behavior. Among those who met Research Diagnostic Criteria, about 20% demonstrated more chronic, low intensity aggressiveness, whereas about 10% demonstrated low frequency intense anger outbursts (Coccaro et al., 2014b). Because the behavioral outbursts are relatively rare in this latter group, treatment outcome studies may need long-term follow-ups to evaluate success (Coccaro et al., 2014b). Persons with high frequency and high intensity anger outbursts show some resemblance to the Disruptive Mood Dysregulation Disorder

described later. It may take more than frequency and intensity to differentiate the subtypes of dysfunctional anger. In a recent proposal, duration, latency, and threshold of anger are considered in conjunction with frequency and intensity when differentiating IED and other forms of dysfunctional anger (Fernandez et al., 2014; Garza, Fernandez, & Vargas, 2011).

4.1. Prevalence of IED anger

Because anger is the very defining element of IED, prevalence statistics do not attempt to extricate anger from the whole syndrome. The DSM-5 criteria for IED were expanded to include verbal aggression including tirades and tantrums. Accordingly, the prevalence of IED is expected to be higher in DSM-5 than in previous diagnostic criteria (McCloskey, Lee, Berman, Noblett, & Coccaro, 2008).

In the National Comorbidity Survey — Replication Study (NCS-R), a face-to-face representative survey of over 9000 US adults conducted between 2001 and 2003, the 12-month and lifetime prevalence of DSM-IV IED were estimated to be 3.9% and 7.3%, respectively (Kessler et al., 2006). IED was weakly correlated with ethnicity, educational status and most other sociodemographic variables, It was however, most common during adolescence and declining substantially across adulthood, higher in males than females (Ahmed et al., 2010), and twice as common in those who do not complete high school compared to those who do. In most cases the onset of IED precedes other comorbid disorders. Careful assessments suggest that IED is common in outpatient contexts: in a sample of 1300 psychiatric outpatients, current and lifetime prevalence of DSM-IV IED were 3.1% and 6.3%, respectively (Coccaro, Posternak, & Zimmerman, 2005). While 60% of these patients actually expressed interest in treatment for IED, only 20% were actually receiving such treatment; the rest were being treated mainly for secondary comorbid disorders.

Three large epidemiological studies suggest that IED is more common in the US than in other countries, even in some countries with high rates of violence and political conflict. For example, in Iraq, the 12-month and lifetime prevalence of DSM-IV IED were 1.5% and 1.7%, respectively (Al-Hamzawi et al., 2012) and in South Africa, the lifetime prevalence of the NCS-R "narrow" definition of IED was 2% as compared to 5.4% in the US (Kessler et al., 2006). Similarly, prevalence rates of IED have been estimated to be 2.1% for lifetime and 0.7% for 12-month in a large community sample in Japan (Yoshimasu & Kawakami, 2011), perhaps reflecting cultural prohibitions of public display of strong anger (Safdar et al., 2009). Further, it raises the possibility of methodological differences in data collection or else veritable differences in culture.

4.2. Models of the etiology of anger within IED

As the core feature of IED is anger, etiological models of IED are relevant for understanding the genesis of problems with anger. IED has been related to high rates of parental under-involvement, lack of care, childhood maltreatment and trauma compared to psychiatric or healthy controls (Fanning, Meyerhoff, Lee, & Coccaro, 2014; Lee, Meyerhoff, & Coccaro, 2014; Nickerson, Aderka, Bryant, & Hofmann, 2012).). Specifically, childhood maltreatment accounted for 15% of the variance in aggression in a sample diagnosed with IED, with specific effects for childhood physical abuse but not sexual or emotional abuse after controlling for demographic variables. Congruent findings link IED to a family history of anger attacks, which could intensify the risks for physical abuse (Ahmed et al., 2010).

Several lines of work suggest biological correlates of IED. Animal and human research indicates that impulsive aggressiveness is inversely related to central serotonin (5-HT) activity, as indexed by numbers of platelet 5-HT transporters and residual peak delta prolactin levels. Congruently, selective serotonin reuptake inhibitors have reportedly moderated certain aspects of IED such as overt aggression (e.g., Coccaro, Lee, & Kavoussi, 2009, 2010). However, this area of research on

serotonin and impulsive aggressiveness is not without conflicting results (as reviewed in Coccaro et al., 2010).

In one innovative study of moderate IED, electroencephalographic (EEG) activity was used to index responses to visual and auditory stimulation designed to produce agitation, as compared to EEG during periods of rest (Koelsch, Sammler, Jentschke, & Siebel, 2008). During stimulation, the participants with IED showed greater decreases in power of oscillatory activity within the theta and alpha bands and greater increases in the beta band (though this was attributable to both muscle activity and brain activity) as compared to controls not diagnosed with IED. These findings indicate that those with IED were more aroused by auditory/visual stimulation designed to produce agitation than were those without IED. As such, findings are suggestive of a greater biological reactivity to certain types of agitating stimuli.

Recently, elevated levels of oxidative stress indicators in the central nervous system were shown to be correlated with IED (Coccaro, Lee, & Gozal, 2014a), echoing observations of elevated oxidative stress in a range of psychiatric diagnoses. Two reliable indicators of oxidative stress, namely, 8-hydroxy-20-deoxyguanosine (8-OH-DG) and 8-isoprostane (8-ISO) were obtained from plasma of 69 individuals diagnosed with IED, a psychiatric control group diagnosed with DSM-IV Axis I or Axis II disorders, and a control group without major DSM-IV diagnoses. Levels of 8-OH-DG and Log 8-ISO were significantly higher in the IED group compared to the psychiatric or healthy control groups. The oxidative stress indices were also significantly correlated with a measure of impulsive aggression, and the strength of this correlation was significantly higher than that observed for personality traits of neuroticism, extraversion, and psychoticism.

4.3. Is anger related to poor outcomes in IED?

There is considerable evidence that IED with its central feature of anger leads to poor outcomes. A large epidemiological survey found that IED was associated with nine of 12 physical health problems, including coronary heart disease, hypertension, stroke, diabetes, arthritis, back/neck pain, ulcer, headaches, and other chronic pain syndromes (McCloskey, Kleabir, Berman, Chen, & Coccaro, 2010). The first three of these health problems are consistent with a well-established link of hostility with cardiovascular disease (Smith, 1994). Poor interpersonal functioning associated with IED is also illustrated in several case narratives for adults (Berner, 2007; Coccaro & McCloskey, 2006and children (Paone & Douma, 2009).

5. Oppositional Defiant Disorder (ODD)

ODD is defined as "negativistic, hostile, and defiant" behavior lasting at least 6 months, as evidenced by at least 4 of 8 symptoms occurring on a frequent basis. Two of the 8 symptom criteria specifically reference irritability (Stringaris & Goodman, 2009), including losing one's temper, and being touchy or easily annoyed. Others are strongly suggestive of anger, including being spiteful or vindictive, angry and resentful, and arguing with adults. Hence almost by definition, all children who meet criteria for ODD demonstrate difficulties related to anger.

In DSM-5, ODD, is now grouped under the Disruptive, Impulse Control, and Conduct Disorders, along with IED. To qualify for the diagnosis, symptoms must also exceed what is appropriate for age, gender, and cultural context. The symptoms occur almost daily for at least 6 months in those under 5 years old, and at least weekly for a minimum of 6 months in those 5 years old and above. The chronicity and early onset are consistent with the idea that this could be conceptualized as a disorder of temperament. In other words, anger recurs often enough to suggest a proneness to that emotion rather than a mere transient fluctuation of mood. There is some evidence that ODD may also involve a lack of insight, in that those with the disorder are frequently viewed as angry, conflictual, and inclined to blame others without accepting personal responsibility (Linseisen, 2008). The symptoms may occur in one or multiple settings.

Though often mistaken for Attention Deficit/Hyperactivity Disorder, the diagnosis of ODD is not applicable if its criteria are only met during situations that require sustained effort and attention. With regard to other competing diagnoses, ODD shares the anger component of IED but not the highly aggressive component of the latter. ODD may also resemble DMDD as indicated earlier but DSM-5 states that the severity, frequency, and chronicity of angry outbursts are greater in the case of the latter.

5.1. Prevalence/prominence of ODD anger

Because ODD is virtually defined in terms of anger, the prevalence statistics reported here do not attempt to separate anger from the overall syndrome. The prevalence of ODD averages 3.3% worldwide, and ranges from 1% to 11% depending on research methodology (Canino, Polanczyk, Bauermeister, Rohde, & Frick, 2010). The prominence of anger in ODD is highlighted in multiple case studies conducted in various countries (c.f. Anastassiou-Hadjicharalambous & Essau, 2013; Marco, García-Palacios, & Botella, 2013).

5.2. Models of the etiology of anger within ODD

A large body of research has accumulated in support of a parent–child transactional model of ODD (Greene, Ablon, & Goring, 2003). Specifically, the way in which parents and other authority figures respond to a child's noncompliance can exacerbate the child's frustration and anger to the point of a vicious, maladaptive cycle in which adult and child are locked in conflict.

In a developmental model (Stringaris & Goodman, 2009), irritability is proposed as one of three core components of ODD, the other two being "Headstrong" and "Hurtful". A "convergence–divergence model" is put forth in which different traits or stressors converge on ODD as "an interim shared outcome before diverging again in their long-term outcomes" (p. 411).

Dispositional factors and situational variables may interact with genetic factors in increasing the risk of ODD. For instance, ODD symptoms have been related to an interaction of the long form of the serotonin transporter genetic polymorphism with family stress including caretaker hostility (Lavigne et al., 2013).

5.3. Is anger related to key outcomes in ODD?

In considering the long-term implications of ODD for the development of other syndromes, several researchers have distinguished between ODD symptoms involving subjective feelings of anger (e.g., touchy or annoyed) and those involving behavioral expressions of anger and defiance (Drabick & Gadow, 2012). In this study involving maternal and teacher ratings of 1160 youth, subjective experiences of anger in ODD appeared particularly related to anxiety disorders as well as mood disorders. Others have found that the subjective anger symptoms predicted anxiety disorders over a three-year follow-up period (Rowe, Maughan, & Goodman, 2004; Stringaris & Goodman, 2009). Conversely, expressions of defiance appear to be more predictive of conduct disorder, although some evidence suggests that both the subjective affect and behavioral expression factors can predict conduct disorder symptoms (see Drabick & Gadow, 2012 for review).

Beyond the risk of major syndromes, the dysregulation of anger observed in ODD poses a strong risk of conflict with parents, teachers and others perceived to be in positions of authority. This may further elicit anger and fear toward the child (Bradshaw, Glaser, Calhoun, & Bates, 2006), thus exacerbating conflict. Among youth referred for clinical services, those with ODD have evidenced greater social impairment and family dysfunction than those without ODD or Conduct Disorder (Greene, Biederman, Zerwas, Monuteaux, et al., 2002), families of

those with ODD being less cohesive and more conflictual. Taken together, findings suggest that the ODD may create impairment across multiple domains, including school, parents, and siblings.

6. Disruptive Mood Dysregulation Disorder

Disruptive mood dysregulation disorder (DMDD) was first introduced as a diagnosis in the DSM-5. DMDD is defined by (a) temper outbursts that are disproportionate to the situation and occur three or more times per week for a year or more, and (b) persistent irritability or anger across settings on most days. This second criterion distinguishes DMDD from ODD. The diagnosis is to be considered for children ages six to 18 who manifest the onset of symptoms before age 10. Prevalence estimates appear to be about 1% (Copeland, Angold, Costello, & Egger, 2013).

Criteria for the disorder were largely based on work by Leibenluft and colleagues who used the label of severe mood dysregulation (SMD) to refer to reactive aggression or anger occurring at least three times per week, chronic negative affect such as anger or sadness present at least half of the time, and at least three symptoms of hyperarousal (Leibenluft, Charney, Towbin, Bhangoo, & Pine, 2003; Leibenluft, 2011). Leibenluft's work clarified that children with SMD did not appear to have bipolar disorder, nor did they have elevated rates of bipolar disorder in their families; rather, the vast majority appeared to meet criteria for ADHD or ODD. Children diagnosed with SMD appeared to show greater psychophysiological responsivity to laboratory tasks designed to invoke frustration than did healthy controls (Rich et al., 2007) and differential neural responses when viewing facial displays of anger (Thomas et al., 2012). Despite the history of related work, it is important to note that the DSM-5 definition does not quite match the syndrome studied by Leibenluft and colleagues, in that the former does not require hyperarousal (Sparks et al. 2014).

Early work has suggested that DMDD as defined in DSM-5 may be difficult to assess reliably, may have problematically high overlap with other disorders, and may not be sustained over time. In the DSM-5 field trials, inter-rater reliability was low (kappa = .25) and variedsubstantially across settings (ranging from .06 to .49) (Regier et al., 2013). Across three large samples, the odds ratio for ODD has ranged from 52 to 103-fold for those with DMDD, with 70% of the children diagnosed with DMDD meeting criteria for oppositional defiant disorder (Copeland et al., 2013). In another large outpatient sample, nearly all (96%) of youth diagnosed with DMDD met criteria for oppositional defiant disorder or conduct disorder (Axelson et al., 2012). One study found that less than half of children persisted with DMDD symptoms at one-year follow-up (Brotman et al., 2006).

Despite the need for a more refined understanding of this diagnosis, early research provides evidence that frequent temper outbursts, at least when combined with chronic negative mood, are important for understanding outcomes. Across samples, DMDD has been related to poor functional outcomes (Dougherty et al., 2014), including substantive difficulties in parent, sibling, and teacher relations, school suspension, and mental health service use, difficulties that remained substantially elevated after controlling for other comorbid conditions (Copeland et al., 2013). Nonetheless, given the high rates of overlap with other conditions and the inadequate diagnostic reliability, we will not elaborate further on this diagnosis.

7. Borderline Personality Disorder

The DSM-5 diagnosis of Borderline Personality Disorder (BPD) requires the presence of at least 5 out of 9 criteria, of which one is inappropriate intense anger and another is affective instability possibly manifested as irritability. These are regarded as the most common and more intractable of BPD features (e.g., Zanarini et al., 2007). Anger and related affective instability tend to be highly correlated with many of the other BPD diagnostic criteria such as tendencies toward self-

destructive behaviors or suicidality (e.g., Evren, Cınar, Evren, & Celik, 2011).

7.1. Prevalence of anger in BPD

In two large scale samples of inpatients diagnosed with BPD, 87% to 89.2% reported significant concerns about anger at baseline (McGlashan et al., 2005; Zanarini et al., 2007). At 2- and 10-year follow-up assessments, about half of both samples continued to report significant concern about anger.

Researchers have also conducted studies to examine temporal and intensity aspects of anger within BPD. In one study, anger was induced by having participants assume the role of protagonist in a short story. Although those with BPD did not differ in magnitude of their initial anger ratings, subjective anger persisted longer in those diagnosed with BPD than in a control group of healthy students (Jacob et al., 2008).

Several studies suggest that anger in BPD involves pronounced lability. This is observed in self-report studies in comparison to healthy and depressed controls (Henry et al., 2001; Koenigsberg et al., 2002). Findings of experience sampling studies also suggest that compared to healthy controls, persons with BPD show marked instability in negative affective states compared to healthy controls (Ebner-Priemer, Eid, Kleindienst, Stabenow, & Trull, 2009) and depressed controls (Trull et al., 2008). Marked shifts in anger appear to be a particularly robust way to differentiate those with BPD from those with major depressive disorder (Trull et al., 2008). Going beyond affective valence, experience sampling research suggests that BPD is characterized by more dramatic shifts over time in quarrelsome behavior within individuals (Russell, Moskowitz, Zuroff, Sookman, & Paris, 2007).

The centrality of anger in BPD and its duration and intensity have been portrayed in several popular movies as well as many systematic case studies. Such case studies have been cast within the psychodynamic (Arthur, 2000) and cognitive-behavioral frames of reference (Nee & Farman, 2007).

7.2. Models of the etiology of anger within BPD

Several models have been suggested to explain anger within BPD. The diagnostic criteria emphasize that anger within BPD is often triggered by real or imagined abandonment. Often, marital or romantic partners become the target of anger when they "fall from grace" over the course of intense unstable relationships (Jeung & Herpertz, 2014). This contrasts with the anger in IED which is not usually conceptualized as a response to specific interpersonal contexts. Consistent with the idea that anger is closely tethered to perceived rejection, those with BPD reported extremely high sensitivity to rejection on self-report measures, showed a more rapid latency for processing rage-related words after viewing words related to rejection, and showed strong tendencies to rage after perceived rejection in a 28-day experience sampling study (Berenson, Downey, Rafaeli, Coifman, & Paquin, 2011). Beyond their sensitivity to overt cues of rejection, persons diagnosed with BPD may be prone to perceiving such cues when not present. That is, individuals with BPD have been shown to be faster in identifying anger in faces, but also inclined to perceive anger in faces where no objective evidence of anger was present (Veague & Hooley, 2014). Taken together, these findings support the importance of rejection sensitivity in understanding anger in BPD.

It has been argued that the fear of abandonment in BPD can be understood as the result of preoccupied, unresolved, or disorganized attachment (Morse et al., 2009). Along similar lines, those with BPD have been found to have high rates of unresolved and fearful attachment styles as measured on the Adult Attachment Interview (Agrawal, Gunderson, Holmes, and Lyons-Ruth (2004).

Linehan and colleagues theorize that BPD anger originates in the invalidating environment of childhood (Neacsiu, Bohus, & Linehan, 2014; Salsman & Linehan, 2006). This is not inconsistent with recent

findings from a bivariate twin-siblings study in which a significant phenotypic correlation between BPD and trait anger was explained by environmental influences almost equal to genetic influences (Distel et al., 2011). However, in a cross-sectional study of students with BPD features, invalidating responses during childhood did not predict anger rumination or other symptoms of BPD (Sauer-Zavala, Geiger, & Baer, 2013), perhaps due to the reliance on an analog sample.

Considerable research in BPD highlights a general emotion dysregulation underlying the tendencies toward poor regulation of anger (Carpenter & Trull, 2013), with anger conceptualized as just one of several indicators of negative affectivity within BPD (Trull, 2001). This perspective integrates a number of correlates of BPD as related to general emotion dysregulation, including neurobiological deficits of the prefrontal cortex, early adversity (family history of impulse control disorders and mood disorders), disinhibition and poor response inhibition among those with BPD, and attentional biases toward emotion stimuli (Carpenter, Bagby-Stone, & Trull, 2013).

A more specific emotion model suggests that when those with BPD experience unbearable levels of shame, they supplant shame with the more empowering emotion of anger. Structural equation modeling has generated support for the idea that anger and anger rumination statistically mediate the link between shame and BPD symptoms (Peters, Geiger, Smart, & Baer, 2014).

From a philosophical perspective, Potter (2008) construes the anger of BPD as a product of perceived wrongdoing, typically within a relational context. This is consistent with recent attempts to deconstruct anger (Fernandez, 2013a). As such, Potter conceptualizes the anger of BPD as a moral assertion best understood from the patient's first person perspective, and the expression of anger as an attempt to assert the legitimacy of the claim.

7.3. Is anger related to poor outcomes in BPD?

Research suggests that BPD is related not just to anger, but that the anger often leads to significant conflict in relationships; in turn, these conflicts appear to have major repercussions such as self-harm and clinical crises that occur far too often. In a major epidemiological study, symptoms of BPD were related to heightened risk of marital violence, as well as marital dissolution (Whisman & Schonbrun, 2009). Beyond the marital relationship, anger appears to be one of the major predictors of premature treatment termination of therapy by BPD patients (Kelly et al., 1992; Rüsch et al., 2008; Smith, Koenigsberg, Yeomans, & Clarkin, 1995; Wnuk et al., 2013). It has been argued that when anger and rage exacerbate the interpersonal stress in those with BPD, these conflicts in turn intensify the likelihood of self-harm (Welch & Linehan, 2002); this is regarded as the most important trigger of suicide attempts in BPD (Brodsky, Groves, Oquendo, Mann, & Stanley, 2006). A study of substance dependent inpatients found that anger severity and borderline personality disorder significantly predicted suicidal attempts, and that this was not a mere artifact of co-occurring depression or anxiety (Evren et al., 2011). In clinical contexts, difficulties regulating anger have been viewed as a central target for treatment in BPD (Rizvi, Steffel, & Carson-Wong, 2013).

8. Bipolar Disorder

Although much of the emotion research in bipolar disorder (BD) has focused on happiness, excessive anger is a cardinal symptom of mania within the DSM-5 diagnostic criteria (American Psychiatric Association, 2013). In support of the diagnostic emphasis on anger, anger is identified as a core facet of manic symptoms across several factor analytic studies of adults (Cassidy, Forest, Murry, & Carroll, 1998; Serretti & Olgiati, 2004), and is observed in most manic episodes among children and adolescents (Hunt et al., 2009; Wozniak et al., 2005).

8.1. Prevalence of anger in BD

In adults and children with BD, anger is highly common. In one community-based representative sample, the diagnosis most robustly correlated with experiences of being "mad" in the past 30 days was bipolar disorder (Barrett, Mills, & Teesson, 2013). In pediatric bipolar disorder, anger and aggression are often dominant reasons for referral (Wozniak et al., 2005).

It does not appear that anger is strictly a concern during manic episodes or for those with severe forms of the disorder. Anger has been found to be common during prodromal phases of episodes (Skjelstad, Malt, & Holte, 2010). During depressive episodes, people with bipolar disorder report about twice the level of anger attacks (62%) reported by those with unipolar depression (Perlis et al., 2004). Elevated levels of anger have also been reported among those with bipolar II disorder (Benazzi, 2003; Benazzi & Akiskal, 2005) and among adolescents diagnosed with bipolar disorder (Rucklidge, 2006). Taken together, these studies suggest that anger is a common concern for those with bipolar disorder, even outside of the manic episodes.

Recent work suggests that anger may be a concern even during periods of relative wellness. In a longitudinal study, participants with BD reported ongoing anger difficulties across follow-up that were not explained by episode status (Ballester et al., 2014). Laboratory research confirms this heightened anger. In a sample of participants with remitted bipolar disorder, researchers documented increased sensitivity to provocation during the ultimatum game (Koenigs & Tranel, 2007) as compared to healthy controls (Duek, Osher, Belmaker, Bersudsky, & Kofman, 2014). Recent work in which participants were followed with monthly interviews until achieving remission, confirms sustained elevations of anger and aggression on the Aggression Questionnaire after remission in Bipolar I disorder as compared to a well-matched non-mood-disordered control group, $eta^2 = .10$ for Verbal Aggression, eta^2's $= .18–.19$ for Anger, Physical Aggression, and Hostility (Johnson, Tharp, Peckham, & McMaster, 2015). Some might wonder whether the heightened anger of those with bipolar disorder reflects the difficult circumstances that the disorder can engender. This does not appear to be the case, in that those at risk for the disorder do endorse difficulties with anger. That is, persons at risk for the disorder by virtue of subsyndromal symptoms on the Hypomanic Personality Scale obtain high Novaco Anger Scale scores (Cooke & Jones, 2009). In parallel, higher scores on a measure of cyclothymic temperament were found to predict more frequent daily reports of anger (Kwapil et al., 2013). Anger, then, appears to be elevated in at risk samples, and so is unlikely to merely reflect the difficult circumstances that unfold as a consequence of manic episodes.

Taken together, researchers have established that anger is a common concern for those with bipolar disorder, and that this concern is present across pediatric and adult age groups. Anger appears to be a common feature of manic episodes and their prodromes, but can also be observed outside of episode and in those at risk.

Although anger is relatively more common for those with this condition than for controls, many with bipolar disorder do not report difficulty with anger or rages, and persistent irritability does not appear to predict the onset of disorder (Stringaris et al., 2010). Carlson has argued that an exclusive focus on rage as a diagnostic indicator will lead to misdiagnoses of bipolar disorder among youth. In a large sample of inpatient youth who had clinical records of rages, one-third were clinically assigned a diagnosis of bipolar disorder. Nonetheless, only 9% met criteria for bipolar disorder when more careful consensus diagnosis procedures were applied (Carlson, Potegal, Margulies, Gutkovich, & Basile, 2009). In one 20-year longitudinal follow-up of 631 adolescents, irritability, as defined by parent, teacher, and self-report of tantrums, arguing or talking back, temper and anger problems, predicted the onset of depressive and generalized anxiety disorders but not bipolar disorder (Stringaris et al., 2009). It is also relevant that children with SMD, which encompasses anger outbursts coupled with other diagnostic

criteria, do not show elevated rates of personal or family diagnoses of bipolar disorder (Leibenluft, 2011). Hence, clinicians may be too quick to diagnose bipolar disorder when the client presents with irritability, anger, and rages. It is important to understand that irritability, anger, or rages do not appear to be strong diagnostic markers for bipolar disorder, despite their frequent co-occurrence. Rather, it would seem that many people with bipolar disorder struggle with anger during prodromal periods and episodes, and that some, but not all, continue to do so after remission. More research is needed, though, as some studies suggest that anger elevations can be observed before onset in those with high levels of subsyndromal symptoms.

8.2. Models of the etiology of anger in BD

Duek et al. (2014) raised the possibility that anger could be related to the heightened approach motivation in BD. As mentioned above, anger has been conceptualized as an approach-related emotion, and a body of research suggests that those with bipolar disorder and those at risk for bipolar disorder display heightened approach-related motivation, even during euthymic periods (Johnson, Edge, Holmes, & Carver, 2012). Working within this framework, researchers have shown that undergraduates at risk for bipolar disorder, as measured with the Hypomanic Personality scale, show greater psychophysiological reactivity to goal thwarting in the form of rising tuition costs (Harmon-Jones et al., 2002), and that frustrative responses to nonreward can predict a worse course of mania (Wright, Lam, & Brown, 2008). Youth diagnosed with BD also have been shown to display changes in the activation of the anterior cingulate and bilateral parietal lobe in response to frustration feedback as compared to controls (Rich et al., 2010). Although others have failed to find greater reactivity to goal frustration in the context of a video game among those diagnosed with bipolar I disorder, video games may not be a meaningful enough stimulus for some participants (Edge, Lwi, & Johnson, 2015).

Other research suggests that the ability to regulate responses and sustain executive control in the face of frustration may differentiate those with BD from controls or those with other forms of mood dysregulation. In one study, those with pediatric bipolar disorder and those with SMD both reported greater arousal in response to a frustrating task than did healthy controls, but those with BD were differentiated from those with SMD by a lower P3 response to frustration, a sign of diminished executive function (Rich et al., 2007). This is consistent with recent findings that self-rated difficulties regulating impulsive responses to emotion were correlated with sustained anger and aggression within BPD (Johnson & Carver, 2016).

8.3. Does anger help explain key outcomes in BD?

The study of anger within bipolar disorder might help us understand the troublingly high rates of aggression and violence observed in bipolar disorder (Ballester et al., 2014; Perroud, Baud, Mouthon, Courtet, & Malafosse, 2011). In the NESARC epidemiological study, 25.34% of those with bipolar I disorder and 13.58% of those with bipolar II disorder reported aggressive behavior after age 15 years as compared to less than 1% of those without lifetime psychiatric disorder. Within inpatient samples, mania has been found to be the diagnosis most associated with aggression (Latalova, 2009). Aggression also appears to be related to the severity of bipolar diagnoses, with substantially higher aggression levels among those with pediatric diagnosis of bipolar I compared to milder bipolar spectrum diagnoses (Demeter et al., 2013).

Aggression (angry or otherwise) is one of the most significant symptoms of childhood bipolar disorder (Biederman et al., 2012a; Farchione et al., 2007). CBCL scoring for pediatric bipolar disorder has been developed as the sum of Attention, Aggression, and Anxiety/depression subscales, and this trio of scales has been found to have high sensitivity and specificity in differentiating those with bipolar disorder from healthy controls and those with ADHD (Uchida et al., 2014). Researchers have

found that the sum of these three CBCL scales predicts the onset of bipolar disorder (Biederman et al., 2009) and is higher among siblings (Biederman et al., 2012b) and affected offspring of those with BD compared to controls (Giles, DelBello, Stanford, & Strakowski, 2007). Separate analyses of the CBCL Aggression scale suggest that it is also elevated among undiagnosed offspring of those with bipolar disorder (Maoz et al., 2014). Controversy remains, though, some researchers reporting that pediatric bipolar CBCL scores were not significantly elevated among those with clinical interview-based diagnoses of BD (Halperin, Rucklidge, Powers, Miller, & Newcorn, 2011; Volk & Todd, 2007).

As with aggression, multiple studies suggest that bipolar disorder is related to violence (McNiel, Eisner, & Binder, 2003). Several community epidemiological studies have documented high rates of violence and concomitant legal problems among those diagnosed with bipolar disorder. For example, in the National Comorbidity Survey of 5865 persons, 16% of those with bipolar disorder reported engaging in physical fights in the past year, a rate that was 8-fold higher than in the general population (Corrigan & Watson, 2005). People with bipolar disorder are convicted for violent offenses at more than four times the rate observed in the general population (Arseneault, Moffitt, Caspi, Taylor, & Silva, 2000; Casiano, Belik, Cox, Waldman, & Sareen, 2008). In sum, data from community representative samples suggest that problems with aggressive behavior are a substantive concern for those with bipolar disorder.

Aggression and violence appear particularly likely when those with BD are experiencing current manic and depressive symptoms, comorbid substance-related diagnoses (Grunebaum et al., 2006; McNiel et al., 2003), borderline personality disorder (Carpiniello, Lai, Pirarba, Sardu, & Pinna, 2011), and PTSD (Garno, Gunawardane, & Goldberg, 2008). Hence symptom levels and comorbid conditions may be of importance for understanding the heightened rates of aggression, although comorbid conditions do not appear to fully explain the aggression levels observed within bipolar disorder (Johnson & Carver, 2016; Van Dorn, Volavka, & Johnson, 2012).

9. Conclusions

Anger is core to the DSM-5 definitions of five disorders. These are Intermittent Explosive Disorder (IED), Borderline Personality Disorder (BPD), Bipolar Disorder (BD), Disruptive Mood Dysregulation Disorder (DMDD), and Oppositional Defiant Disorder (ODD).

Although we have focused on these five disorders, it is worth noting that anger and its variants such as irritability and rage have received increasing attention in other disorders too. According to DSM criteria, irritability is a cardinal symptom of major depressive disorder in youth (American Psychiatric Association, 2013). Support for this has been observed in major (epidemiological or community-based) studies where irritability and sad mood were found to co-occur in a sample of youth (Stringaris, Maughan, Copeland, Costello, & Angold, 2013). Prominent irritability was reported by about half of adults with a lifetime diagnosis of Major Depressive Disorder (Fava et al., 2010). Similarly, PTSD includes irritable behavior and angry outbursts as a diagnostic criterion that is related to arousal and/or reactivity, and this symptom has been a focus for research in casualties of combat (McHugh, Forbes, Bates, Hopwood, & Creamer, 2012) and victims of abuse (Pascual-Leone & Paivio, 2013). Other syndromes where anger is an important focus of research though not a diagnostic criterion, are substance dependence (Shopshire & Reilly, 2013) and intellectual disabilities (Willner, Jahoda, & Larkin, 2013).

Across the five disorders that are the focus of this review, anger is not just highly prevalent but also a major clinical concern. Considerable research suggests that the poor outcomes related to these disorders are often attributable to difficulties with regulating anger. Despite the strong parallels in the importance of anger, there are some important paradigmatic differences in the way anger has been characterized and/or

explained in each disorder. We will touch on three such paradigms: affective chronometry, neuroscience, and cognitive processes of anger.

In the Introduction, we referred to temporal properties, or affective chronometry (Davidson, 1998, 2004), as relevant to an understanding of anger. The increasing availability of paradigms for continuous measurement of affect has stimulated much interest in understanding frequency, duration and intensity (Gross & Jazaieri, 2014; Ruef & Levenson, 2007), as well as latency and threshold (Fernandez et al., 2014). There is some optimism that these dimensions could be meaningfully applied to distinguish different forms of anger (Potegal, 2010).

The DSM-5 suggests that anger takes slightly different forms across disorders. In IED and ODD, anger recurs episodically and with high intensity. In DMDD, irritability is prominent. BD is characterized by high levels of "anger attacks". IED and ODD are both classified as Impulse Control Disorders, highlighting the belief that these are both driven by a lack of control in the expression of anger. In addition, they share the quality of quick onset/latency, and low threshold. BD and BPD demonstrate high rates of chronicity of anger. BD, BPD, and IED, are characterized by aggressiveness as well. Finally, research using a range of methods suggests that anger in BPD is particularly context-dependent and frequently evoked by perceived cues of interpersonal rejection.

Despite the suggestion in DSM-5 that the temporal dynamics of anger differ across these disorders, systematic investigation has been scant and scattered. Indeed, we could identify no published studies comparing the affective chronometry of anger across all these five disorders. We were not able to identify experience sampling and laboratory studies of the chronometry of anger outside of BD and BPD. As such, statements that a given disorder is tied to more chronic, more intense, less controllable, or more context-dependent anger remain tentative. A key goal, then, would be to empirically test whether these temporal features of anger genuinely distinguish among these DSM diagnostic categories (Garza et al., 2011) or if they are more consistent with a dimensional approach to anger. Doing so might help with case formulation, an important goal given that misdiagnosis remains a common problem.

Delving into the etiology of anger within these conditions, several differences emerge. Etiological models of anger in IED have drawn attention to cultural factors, childhood maltreatment, serotonin, physiological reactivity to agitation, and oxidative stress. In BPD, the models focus on affective instability, poor emotion regulation and skill, selective attention to cues of anger, ruminative responses to anger, and invalidating childhood experiences. In BD, there is some evidence of a vulnerability to more intense reactivity to frustrative non-reward, including diminished executive control and increased impulsivity. Hypotheses about the new diagnosis of DMDD await investigation that takes into account its high levels of comorbidity with conduct disorder and other externalizing conditions. In ODD, the excessive anger is attributed to the way in which parents and authority figures respond to noncompliance in the child. In short, researchers have postulated relatively distinct models of the key variables contributing to anger within each disorder.

The rich literature offers a lens into transdiagnostic commonalities. A long history of research has highlighted the role of serotonergic deficits in people with intense anger, aggression, and/or a broad range of psychiatric disorders (Carver, Johnson, & Joormann, 2008), and so could help explain anger and aggression within many different psychiatric syndromes. Findings of a recent meta-analysis of 175 samples comprising 6500 participants (Duke, Bègue, Bell, & Eisenlohr-Moul, 2013) indicate that serotonergic effects are unlikely to operate as a main effect, in that serotonergic deficits were only modestly correlated ($r = .12$) with anger/aggression/hostility. Other authors have argued that serotonin deficits may amplify other deficits, by contributing to a diminished regulation of other risk factors for anger (Manuck, Kaplan, & Lotrich, 2006). Furthermore, atypical antipsychotics (e.g., risperidone) have been prescribed for aggression in psychiatric populations, on the grounds that they are antagonists to 5-HT2A receptors.

Another key variable to consider would be impulsivity, which has long been related to problems of aggression (Hollander & Stein, 1995). Among the multiple facets of impulsivity, including difficulties with attention or perseverance, a facet of impulsivity that relates to poorly constrained responses to emotion has been found to be particularly related to deficits in regulating anger and its expression (Sharma, Markon, & Clark, 2014), and has been applied to BD (Johnson & Carver, 2016).

Recent advances in cognitive models of anger also merit mention. Evidence has accumulated in support of certain cognitive processes underlying trait anger. As reviewed by Owen (2011), these include selective attention, memory biases, distorted reasoning, and negative rumination. Specifically, those high in trait anger do selectively attend to hostile cues, tend to interpret others' behavior as antagonistic, and are inclined to ruminate over past incidents that provoked anger. Other research indicates that executive function is a requisite for the ability to effectively regulate emotion (Joormann & Gotlib, 2010), and considerable research suggests deficits in executive function are apparent across disorders (Wright, Lipszyc, Dupuis, Thayapararajah, & Schachar, 2014). With regard to reasoning or cognitive appraisal, perceived wrongdoing/transgression has been emphasized as a defining feature of anger. This is consistent with observations of IED, BPD (Potter, 2008), and ODD (Eyberg, O'Brien, & Chase, 2006). In BD, a negative attributional style has been documented as a common correlate (Fletcher, Parker, & Manicavasagar, 2013).

Beyond individual differences, a further line of research suggests that there are important cultural differences in attitudes toward emotion and emotion expression with specific reference to anger (Matsumoto, Yoo, & Chung, 2010), and indeed, important cultural differences in tendencies to value high arousal emotion states (Tsai, Knutson, & Fung, 2006). Family contexts and parenting have been shown to have major influences on teaching emotion regulation (Otterpohl & Wild, 2015) as well as in providing behavioral reinforcement or negative reinforcement for the inappropriate expressions of anger (Snyder, Schrepferman, Brooker, & Stoolmiller, 2007). Within the social context, an individual's preferred levels of dominance and power and his/her relative level of power, have also been shown to have major influences on the intensity of anger (Keltner, Gruenfeld, & Anderson, 2003; Fast & Chen, 2009).

The accumulation of these findings and ideas seems to lead us in the direction of a transdiagnostic perspective of anger. To date, the literature has been fragmented in support of differential models with each psychopathology, and many models that could easily provide important explanatory power have not been tested within specific psychopathologies. In this way, our perspective is similar to those who have called for a transdiagnostic mechanism approach in other arenas (Cuthbert & Insel, 2013; Harvey, Murray, Chandler, & Soehner, 2011). Transdiagnostic approaches to treatment have shown promise for the treatment of anxiety and depression (Barlow et al., 2011) and raise the prospects for similar application to anger.

The transdiagnostic approach dovetails with the integrative approach in psychotherapy. In the same way that psychological diagnoses have been over-differentiated in a way that obscures common mechanisms, the psychotherapy field has witnessed a proliferation of manuals for each specific disorder. However, to the extent that anger is considered as a transdiagnostic issue, therapeutic approaches designed to address core features of anger and anger management could be applied readily within each disorder. Patients once strictly separated according to formal DSM diagnosis would now share treatment on the basis that they share common underlying problems in anger regulation. In this regard, empathy, psychoeducation, self-monitoring, reappraisal, and insight have already received support as common and essential ingredients in anger treatment (Fernandez, 2013b). Several cognitive behavioral anger treatment programs (e.g., Deffenbacher, Oetting, & DiGiuseppe, 2002; Kassinove & Tafrate, 2002) integrate relaxation, reappraisal and social skills training. Recent developments such as cognitive behavioral affective therapy have further enhanced cognitive and

behavioral strategies in combination with experiential techniques (all sequentially integrated) (Fernandez, 2010; Fernandez & Scott, 2009). A key goal, then, would be to consider whether these approaches appear to have efficacy across diagnoses, or whether such treatments actually do need refinement to apply well within different syndromes.

Though integrative therapy within a transdiagnostic framework has been mostly implemented in groups, it does not preclude tailoring of treatment to the individual. Where necessary, psychological interventions could be adapted to the particular profile of risk variables relevant to the individual. As one example, an individual who lacks executive control during frustration tasks might be reluctant to attempt certain emotion regulation skills such as complex reappraisal. Instead, calming behavioral activities or implementation intentions (Webb & Sheeran, 2006) might be more beneficial. An individual who is low on readiness or motivation to change might benefit from motivational interviewing. Yet another who is low on psychological mindedness may benefit from extended psychoeducation before treatment proceeds. In short, there are various client variables (that do not require diagnosis) and variables to which the treatment can be tailored.

In sum, our review highlights that anger is a central feature of psychological disorders of five diagnoses in DSM-5, and for each of these, it appears to be a critical clinical concern. We recognize that anger is central in a broader number of syndromes than those we could cover here. Anger of some form or other can also occur in other conditions psychiatric or otherwise, in the DSM system or outside of it. We hope that this review offers insights into the basic phenomenology, clinical presentation, and etiology of anger-related dysfunction. We note that a growing trend toward transdiagnostic psychopathology has implications for the clinical assessment of anger and is compatible with the parallel move toward more integrative therapies. These emerging perspectives, when backed up with adequate evidence, may help improve the prognosis for the many people with anger-related dysfunction.

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