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THE RELATIONSHIP BETWEEN IMPULSIVITY, AGGRESSION, AND IMPULSIVE-AGGRESSION IN BORDERLINE PERSONALITY DISORDER: AN EMPIRICAL ANALYSIS OF SELF-REPORT MEASURES

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Impulsivity has been repeatedly identified as a key construct in BPD; however, its precise definition seems to vary especially regarding the overlap with aggression. The term *impulsive-aggression*, also generally seen as central to an understanding of BPD, seems to address itself to the interface between the two, but has itself been used inconsistently in the literature, sometimes having reference to a unitary phenotypic dimension, and at other times suggesting some combination of distinct traits. This study examined the relationship between multiple measures of impulsivity, aggression, and impulsive-aggression in a BPD sample ($N = 92$) in order to clarify the relationship between these measured constructs in this clinical population. Results show little relationship between measures of aggression and impulsivity in BPD, with measures of impulsive-aggression correlating strongly with measures of aggression only. Implications of the present results for future research and clinical work with BPD are discussed.

The construct of impulsivity has been repeatedly identified as a key domain in research with borderline personality disorder (BPD); however, the precise definition of this key construct varies, especially in the degree to which forms of aggression are involved. This study explores the empirical overlap between multiple measures of impulsivity, aggression, and impulsive-aggression in BPD patients to shed light on the issue from a measurement perspective. This investigation is particularly important given recent interest in

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the nature and meaning of empirically observed links between these variables and underlying neurobiology in BPD.

IMPULSIVITY AS A CORE FEATURE OF BPD

BPD is characterized in most theoretical frameworks as involving either elevated impulsivity or less of its conceptual opposite, self-control (e.g., Depue & Lenzenweger, 2001; Klar, Siever, & Coccaro, 1988; Linehan, 1993; Millon & Davis, 1996). Consistent with these formulations, recklessly impulsive behavior is directly assessed by one of the DSM-IV criteria for BPD, and other behaviors suggestive of impulsivity are assessed by several other criteria (e.g., frantic efforts to avoid abandonment, unstable relationships, affective instability, difficulty controlling anger). In addition, while impulsivity is neither a necessary nor sufficient sign, research shows it to be a core feature of BPD, showing notable association with the overall diagnosis as well as with other clinical signs indicative of BPD (Ball, Tennen, Poling, Kranzler, & Rounsaville, 1997; Svrakic, Draganic, Hill, Bayon, Przybeck, & Cloninger, 2002; Trull, 1992) and long-term persistence of the disorder (Links, Heslegrave, & van Reekum, 1999).

Briefly, the term *impulsivity* is used in the BPD literature to reflect a lack of planning and/or inhibition of behavior (in contrast to self-control) expressed across a variety of domains, especially if some significant potential for negative consequence is involved. For example, Oquendo and Mann (2000) in a review of the BPD literature define impulsivity as "a tendency toward having a short latency to acting on urges" and suggest that the urges of most clinical relevance are those that can or do result in harm to self or others. Depue and Lenzenweger (2001) emphasize "nonaffective" impulsivity as part of a broad neurobehavioral model of personality disorder. And, similar to Depue and Lenzenweger's formulation, Barratt and colleagues have developed a measure of impulsivity that is nonaffective in the sense that it is orthogonal to anxiety (Barratt, 1994). Barratt's measure in particular has been recommended for studies focused on the neurobiology of personality disorder, including BPD (Skodol et al., 2002).

IMPULSIVITY, AGGRESSION, AND IMPULSIVE-AGGRESSION

Few definitions of impulsivity make explicit reference to aggressive behavior. It has often been suggested, however, that impulsivity serves to potentiate self-destructive and aggressive actions characteristic of BPD and is thus expected to be correlated with forms of aggression, particularly non-premeditated "impulsive aggression" (Barratt, 1994; Goodman & New, 2000; Oquendo & Mann, 2000). Consistent with this, research conducted with animals and humans has repeatedly linked reduced serotonergic system functioning to indices of both impulsivity and aggression. These findings have held up under a variety of research paradigms involving both neurochemical and behavioral interventions, diverse populations, and multiple operationalizations of impulsive and aggressive responding. A detailed re-

view is beyond the scope of the present paper, and the interested reader is referred to excellent reviews by Coccaro et al. (1989, 2001) and by Oquendo and Mann (2000). Coccaro (1992) used the overall pattern of findings in this literature to argue for the existence of a "dimensional brain-behavior relationship" such that "reduced central 5-HT system function in patients with major mood and/or personality disorder is associated with a trait dysregulation of impulse control, the presence of which enhances the likelihood of self- and/or other-directed aggressive behavior, given appropriate environmental triggers" (p. 10). One implication of this theory is that impulsivity and aggression are expected to appear together on the phenotypic level, sufficient to justify use of the descriptive term *impulsive-aggression*.

Other clinical theorists have also described putative psychological, social, and cultural inputs to impulsive and aggressive behavior in BPD. For example, Benjamin (1996) emphasizes social learning experiences in the context of close attachment relationships as providing a template, and also a motivation, to engage in the interpersonal patterns characteristic of BPD (including reckless impulsivity, and aggression to self and/or others). Linehan (1993) emphasizes attempts to regulate affect, often in the context of environmental inputs that are experienced as invalidating or which the patient wishes to change, as a source of impulsive and aggressive behavior in BPD. Similarly, Kernberg (1996; see also Clarkin, Yeomans, & Kernberg, 1999) theorizes that BPD, including its impulsive and aggressive aspects, derives from negative affects that contribute to a lack of integration between positive and negative views of both self and others, which in turn shape the patterns of interpersonal responding characteristics of BPD. Furthermore, Millon (1987) has pointed to the possible role of broader cultural context in shaping impulsive and aggressive elements of BPD, especially an erosion of familial and institutional structures that traditionally served to ameliorate the affective, interpersonal, and identity-based problems associated with BPD. Many others have addressed the topic, and psychosocial theorists have by no means neglected the constructs of interest in this paper. However, particular emphasis on a dimensional relationship between the two constructs, including the existence of an impulsive-aggressive dimension per se, has largely been derived from the more trait-based theory and research linking the BPD features of impulsivity and aggression to underlying neurobiology. It is this latter perspective that the present study seeks to explore.

A recent, three-part review of the BPD literature (Skodol et al., 2002) concluded that "the descriptive, genetic, and biological domains of validation converge in suggesting that impulsive aggression is an important trait underlying disorders such as borderline personality disorder" (p. 952). Guidance as to how to operationalize impulsive aggression is provided by the same authors: "Impulsivity/aggression can be assessed by use of the relevant BPD criteria, the Assault and Irritability subscales of the Buss-Durkee Hostility Inventory (BDHI) (Buss & Durkee, 1957) and the Barratt Impulsiveness Scale (BIS-11) (Barratt & Stanford, 1995), increases on which have

been associated with reduced serotonergic responsivity" (p. 954). The same authors go on to note the importance of suicidality and parasuicidality as important indices of impulsive aggression in BPD.

Despite apparent agreement on the importance of impulsive aggression in BPD among authors working within the general paradigm presented here, there is considerable variability in use of the term, including frequent truncation to simply "impulsivity" or "aggression," depending on the author and context (Goodman & New, 2000). Impulsive aggression *per se* has been also described variously as (1) a single trait-like dimension (Coccaro et al., 1989; Siever & Davis, 1991); (2) a subset of impulsive behaviors (e.g., "impulsivity with an aggressive flair"; Seroczynski, Bergeman, & Coccaro, 1999); (3) a subset of aggressive behaviors (e.g., "unplanned aggression"; Barratt, 1994; Barratt, Stanford, Dowdy, Liebman, & Kent, 1999); or (4) the combination or interaction of separate traits (Depue & Lenzenweger, 2001). As a result, the boundaries of each term, and thus the precise relations between them, can be unclear. Furthermore, distinctions have been made between aggressive acts directed toward others versus toward the self (e.g., as suicide, parasuicide, or forms of reckless self-neglect), and authors vary in the emphasis and significance they give to these two basic directions.

Research results to date have shed little light on the aforementioned distinctions. One analysis conducted by Koenigsberg and colleagues (2001) in a general personality disorder sample showed that scales of the Barratt Impulsivity Scale and Buss-Durkee Hostility Inventory load on the same factor together. They also reported, however, a possible alternative factor solution having similar goodness-of-fit indices that involved orthogonal impulsivity and aggression dimensions. Inconsistent results have also been reported regarding the significance of direct correlations between measures of impulsivity and aggression across diverse clinical and nonclinical populations (Barratt et al., 1999; Coccaro et al., 1989; Seroczynski et al., 1999). The status of the putative impulsive aggression dimension is thus unclear, and has not to our knowledge been directly demonstrated for a BPD sample.

THE PRESENT STUDY

Robust findings linking behavior to biology suggest the existence of an impulsive aggressive dimension linked to underlying biology in BPD that would be expected to manifest phenotypically in trait-like form. Some limited empirical support exists for this proposition, but generally has not been conclusive. In addition, no studies have focused specifically on explication of the relationship using multiple measures of each construct in a well-defined BPD sample. Demonstration of a single, phenotypic dimension for impulsive aggression in BPD would suggest a departure from personality research in nonclinical samples, which typically finds measures of impulsivity and aggression to have little association (e.g., Tellegen, 1982). Overall, our goal is to clarify the relationship between multiple

operationalizations of impulsivity, aggression, and impulsive-aggression in a clinical sample of BPD subjects. Our approach was exploratory, but involved the general expectation that a single impulsive-aggressive dimension would emerge from factor analysis of the various measures.

METHOD

SUBJECTS AND PROCEDURE

Trained interviewers conducted assessments with participants as part of a broader randomized control trial (RCT) comparing three psychotherapies for BPD. After complete description of the study to the subjects, written informed consent was obtained. Participants included for analysis all received a diagnosis of BPD based on DSM-IV criteria as assessed by the International Personality Disorders Examination (IPDE; Loranger, 1999). Participants were excluded if they met criteria for current untreated major depression, substance dependence,¹ mental retardation, or past or present history of Schizophrenia, Schizoaffective Disorder, or Bipolar I Disorder. Exclusion criteria were assessed using the SCID-I interview for DSM-IV (First, Spitzer, Gibbon, & Williams, 1995). High levels of reliability were obtained for the number of DSM-IV BPD criteria met by each subject, $ICC(1,1) = .83$. A good level of reliability for BPD diagnosis was obtained using the five criteria threshold, $kappa = .64$.² Of the 92 participants included in the present analysis, 85 (92.3%) were female. Participant age ranged from 18 to 50 years ($M = 30.75$, $SD = 7.89$). The sample was predominantly Caucasian (62%), unmarried (92%), and educated (51% completed college), but underemployed (64% employed).

Subjects tended to have chronic difficulties, with first contact for psychiatric treatment at a mean age of 17 yrs. Fifty-seven percent of the subjects reported prior suicidal behavior, and 64% reported prior parasuicidal behavior (17% reported neither). Mean Global Assessment of Functioning (from Axis V of DSM-IV) was 50. Overall, these results indicate a substantial degree of symptoms and disrupted functioning experienced over a long period. Two of the DSM-IV diagnostic criteria are particularly salient to this investigation. BPD criterion four, "impulsivity in at least two areas that are potentially self-damaging" was met by 63% of the sample (17% showed subthreshold signs). BPD criterion eight, "inappropriate, intense anger or difficulty controlling anger (e.g., frequent displays of temper, constant anger, recurrent physical fights)" was met by 73% of the sample (19% showed subthreshold signs). The design of the

1. Subjects could meet criteria for past major depression or past substance dependence.

2. A high base-rate of BPD was referred to our treatment study and we are thus quite confident that the sample is comprised of true positive BPD cases. Rater disagreements typically involved discriminating subthreshold cases with significant BPD features from those meeting the requisite five or more criteria.

overall treatment study is described in detail elsewhere (Clarkin, Levy, Lenzenweger, & Kernberg, 2004).

MEASURES

Prior to randomization and treatment in the RCT, an extensive battery of self-report and interview-based measures was administered individually. Participants were encouraged to complete a battery of paper-and-pencil measures between appointments scheduled for administration of the interview-based measures. Order of presentation of the questionnaire-based assessments was not systematically controlled. A subset of measures from the overall battery was included in the present analysis and consists of the following.

Multidimensional Personality Questionnaire (MPQ; Tellegen, 1982). The MPQ is a self-report instrument designed to assess a wide range of personality features. The Control (vs. Impulsivity) and Aggression (toward others) scales were included for analysis. Depue and Lenzenweger (2001) refer to these scales as homogeneous operationalizations of nonaffective constraint and aggression within their neurobehavioral dimensional model of personality disorder. These two scales each have alpha coefficients of .84 in the present sample with means (and standard deviations in parenthesis) of 11.38 (5.91) and 6.32 (4.42), respectively.

Adult Temperament Questionnaire (ATQ; Derryberry & Rothbart, 1988). The ATQ is a self-report measure of adult temperament. The Effortful Control scale assesses control over behavioral responses and attention. As such, it was expected to reflect the opposite of impulsivity. The alpha coefficient observed for this scale in the present sample is .87, with a mean of 3.42 ($SD = 0.71$).

Barratt Impulsivity Scale – 11 (BIS; Patton, Stanford, & Barratt, 1995). The BIS is a self-report measure of trait impulsivity that has been recommended for study of impulsivity/impulsive aggression in BPD (Skodol et al., 2002). The total score was chosen due to the high degree of overlap between BIS subscales as well as to follow the precedent for use in other research. The alpha coefficient observed in the present sample is .76, with a mean of 76.68 ($SD = 10.96$).

Inventory of Personality Organization (IPO; Clarkin, Foelsch, & Kernberg, 2001). The IPO Aggression subscale, used in this study, is a self-report measure of aggressive attitudes and behaviors directed toward others, aggression perceived from others, and self-directed aggression. The IPO was found to have acceptable validity and psychometric properties in another study using the present sample (McClough, Lenzenweger, Clarkin, & Kernberg, 2002), matching performance in two normative samples (Lenzenweger, Clarkin, Kernberg, & Foelsch, 2001). The alpha coefficient for the scale included here was .82, with a mean of 34.27 ($SD = 9.23$).

Anger, Irritability, Assault Questionnaire (AIAQ; Coccaro et al., 1991). The AIAQ is a self-report measure of aggressive behaviors and attitudes. As de-

scribed by its authors, the AIAQ is a direct measure of impulsive-aggression that incorporates items from the Buss-Durkee Hostility Inventory and the Affect Lability Scale, themselves found to be related to reduced central 5-HT functioning. The Direct Assault, Verbal Assault, Indirect Assault, and Irritability subscales were included for analysis as they were rated for adult life (alpha coefficients in the present sample are .86, .68, .79, and .69, respectively). Irritability scales were included along with assault scales based on recommendation by Skodol et al. (2002) for study of impulsive-aggression in BPD. Means and standard deviations (in parentheses) are as follows: Direct Assault = 10.19 (7.15), Indirect Assault = 7.46 (3.53), Verbal Assault = 16.05 (5.32), and Irritability = 20.89 (6.28).

Overt Aggression Scale—Modified for Outpatient (OASM; Coccaro et al., 1991). The OASM is an interview-based measure producing a weighted frequency of aggressive events (verbal and physical) and irritability (subjective and overt) occurring in the past month. This measure was also developed as a measure of impulsive-aggression specifically associated with neurobiological variables (Coccaro et al., 1991). The OASM total aggression and irritability scores were used for purposes of this study and had means (standard deviation in parentheses) of 90.86 (80.97) and 6.40 (1.89), respectively. Alpha coefficients in the present sample are .48 for aggression and .68 for irritability.

STATISTICAL ANALYSIS

The 11 scales just described were included in an exploratory principal components analysis (PCA) with a goal to refine understanding of the impulsivity, aggression, and impulsive-aggression constructs in BPD in terms of their latent structure. Direct inspection of the raw matrix of Pearson correlations supplemented this investigation.

This study involves a small sample for factor analytic work ($N = 92$), and results should thus be viewed with some caution; however, this problem is ameliorated to some degree by an acceptable subject to variable ratio (approximately 8:1), use of reliable measures rather than single items for input, clear expectation of only a small number of factors, and additional inspection of the raw correlation matrix following factor analysis. Care was taken to limit the selected variables only to those deemed directly relevant to the question at hand, yet, the included measures clearly emphasize other-directed forms aggression. Data on suicidal and parasuicidal events were also available for these subjects, but were not included. This was due in part to concerns over the subject to variable ratio in the analyses, and also in part due to an initial screen of data showing near zero correlations between these self-directed forms of aggression and all the other measures reported here.

RESULTS

DESCRIPTIVE DATA

Comparison with nonclinical norms was possible for two measures, the BIS and the MPQ. Participants reported themselves as less controlled, MPQ: $t(90) = -4.06$, $p < .05$, two-tailed, and more impulsive, BIS: $t(90) = 11.19$, $p < .05$, two-tailed, than female undergraduates and a nonclinical female sample, respectively. In fact, the BIS impulsivity scale mean was slightly higher than that reported for a sample of prison inmates (Patton et al., 1995). MPQ Aggression did not reach statistical significance in comparison to a community sample of females, although a trend was evidenced, $t(91) = 1.55$, $p = .12$, two-tailed.³

FACTOR ANALYSIS

Direct inspection of the correlation matrix showed a number of substantial values. Presence of significant intercorrelation in the matrix was further confirmed by Bartlett's test of sphericity, $\chi^2 = 297.20$, $df = 55$, $p < .01$). Analysis of eigenvalues and scree plots from the PCA suggested presence of two factors having eigenvalues of 3.97 and 1.99, respectively (all others less than 1.00), together accounting for 54% of the variance.⁴ Given theory suggesting a unitary impulsive-aggression dimension, a single factor solution was checked. The solution was not compelling. Only aggression and irritability measures had loadings of greater than .50 on the single factor, leaving impulsivity/control without representation. Similarly, only a small amount of individual measure variability was explained (h^2 for each impulsivity scale was below .20).

Turning to the two-factor solution, Varimax rotation was used in an initial analysis to maximize interpretability. Scale loadings on each factor are presented in Table 1. The first factor contained scales tapping aggression, irritability, and impulsive-aggression. The second factor was a clear bipolar dimension ranging from impulsivity to self-control. Combination of variables on each of the high-loading factor scales resulted in high alpha levels (.83 and .78, respectively). Oblique rotation was used to further explore associations between the measures. Direct Oblimin rotation was used ($\Delta = 0$). The same factors emerged, but with the polarity of the impulsivity/control dimension reversed. A nonsignificant factor correlation was obtained between the resulting Aggression and Control/Impulsivity factors, $r(77) = -.18$, ns , two-tailed. The pattern of loadings for each of the two, two-factor rotations is displayed graphically in Figure 1.

3. Significant results were observed with a younger sample of undergraduate females reported by Tellegen (1982, p. 31), $t(91) = 3.82$, $p < .05$.

4. Principal axis factoring produced nearly identical results, with only minor variations in some of the final factor loadings, as did reanalysis with a random split of the sample into halves.

TABLE 1. Orthogonal PCA Solution for Aggression and Impulsivity/Control Variables in BPD

Scale	Factor 1: Aggression	Factor 2: Impulsivity/ Control	<i>h</i> ²
MPQ: Aggression	.80	.09	.65
AIAQ: Verbal Assault	.76	.12	.59
AIAQ: Direct Assault	.71	-.29	.58
AIAQ: Indirect Assault	.69	.03	.47
AIAQ: Irritability	.66	.26	.51
IPO: Aggression	.63	.25	.46
OASM: Irritability	.59	.26	.41
OASM: Aggression	.54	.01	.29
BIS: Total Impulsivity	.05	.85	.73
MPQ: Control	-.07	-.82	.67
ATQ: Effortful Control	-.16	-.76	.60
Eigenvalue	3.97	1.99	
% of variance	34	21	

Note. Values in bold represent scales assigned to each underlying dimension based on loadings with absolute values greater than .50.

Direct inspection of the correlation matrix (Table 2) strongly confirms the independence of measures of impulsivity and aggression. Measures associated with each factor show a clear pattern of within-factor correlation, and few significant correlations for variables across factors.

DISCUSSION
CHARACTERIZATION OF BPD

BPD patients in the present sample had very high levels of impulsivity and low control in comparison to normal subjects. This is consistent with the criteria used to define the sample as well as the main thrust of theory and empirical work with BPD. Theory predicts that elevated impulsivity would predispose toward aggressive action; however, the expected elevation on MPQ Aggression was not significant when compared with a female community sample. A trend in the expected direction, coupled with both a high rate of endorsement for the DSM-IV aggression-related criterion and a lack of available norms for other aggression measures,⁵ makes interpretation of this result tentative. It is, however, consistent with a degree of independence between impulsivity and aggression in BPD.

5. The measures without comparison data were more tailored to clinical populations. In addition, significant results were obtained with a different, but younger and less well-matched, normative sample.

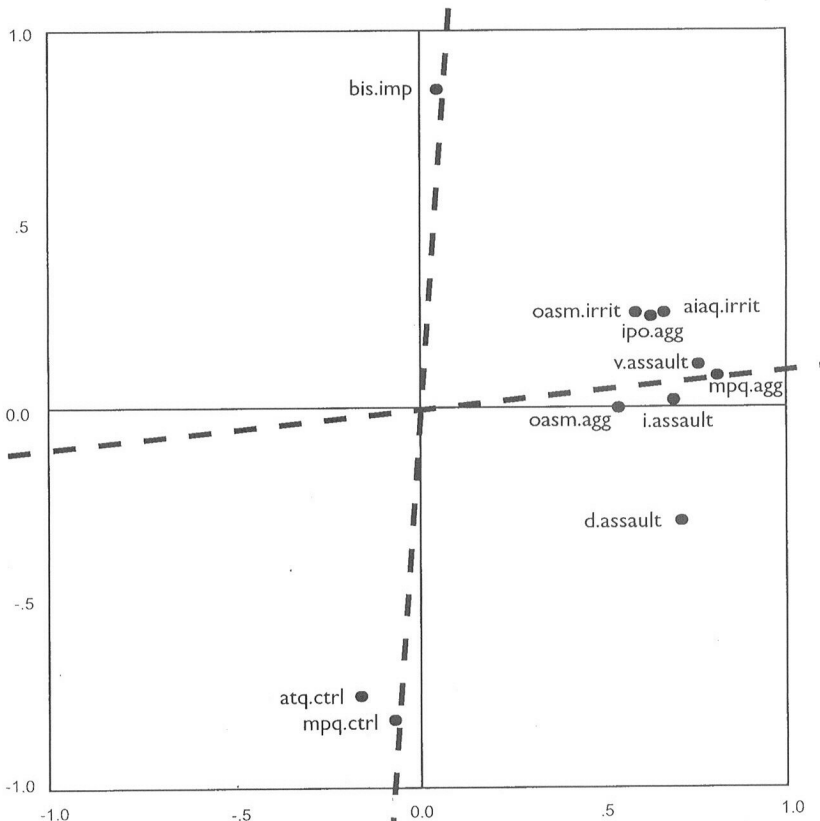


FIGURE 1. Comparison of orthogonal and oblique rotation of factor analytic results.
Note. Axes of the oblique rotation are indicated with dashed lines, $r(77) = -.18$, ns; aiaq.irrit = AIAQ Irritability; atq.ctrl = ATQ Effortful Control; bis.imp = BIS Total; d.assault = AIAQ Direct Assault; i.assault = AIAQ Indirect Assault; ipo.agg = IPO Aggression; mpq.agg = MPQ Aggression; mpq.ctrl = MPQ Control; oasm.agg = OASM Aggression; oasm.irrit = OASM Irritability; v.assault = AIAQ Verbal Assault.

COMPARISON OF CONSTRUCTS: IMPULSIVITY, AGGRESSION, AND IMPULSIVE-AGGRESSION

The main findings of this study suggest that measures of impulsive-aggression, irritability, and aggression are very closely related, forming a single factor with moderate to high raw correlations between individual measures. These measures, both individually and as a factor, have little overlap with measures of impulsivity or self-control, which themselves share considerable variance. Thus, measures of aggression (directed toward others) and control (versus impulsivity) appear to be two distinct, relatively uncorrelated constructs in BPD.

Measures developed specifically to capture putative biologically-based impulsive-aggression (i.e., the AIAQ and OASM) had strong associations with measures of aggression per se, and nonsignificant correlations with

TABLE 2. Correlation Matrix of Aggression and Impulsivity/Control Measures, Grouped by Derived Factors

	Factor 1: Aggression					Factor 2: Impulsivity/Control					
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. MPQ: Aggression	—										
2. AIAQ: Verbal Assault	.54	—									
3. AIAQ: Direct Assault	.51	.51	—								
4. AIAQ: Indirect Assault	.43	.44	.48	—							
5. AIAQ: Irritability	.49	.49	.28	.44	—						
6. IPO: Aggression	.59	.42	.29	.27	.46	—					
7. OASM: Irritability	.36	.38	.24	.35	.37	.33	—				
8. OASM: Aggression	.39	.33	.16	.31	.23	.21	.48	—			
9. BIS: Total Impulsivity	.14	.15	-.10	.13	.17	.15	.24	.00	—		
10. MPQ: Control	-.16	-.20	.07	-.11	-.15	-.16	-.19	-.04	-.66	—	
11. ATQ: Effortful Control	-.15	-.17	.10	-.11	-.35	-.34	-.23	-.10	-.48	.44	—

Note. Values in bold are significant at $p < .05$. Sample size for each correlation ranged from $N = 92$ to $N = 80$ due to missing data on some measures.

measures of impulsivity/control (only three exceptions to this pattern were observed out of 18 relevant comparisons, and all involved Irritability, see Table 2). Thus, from a psychometric perspective, it appears that the theoretical stance most clearly operationalized by the primary, recommended measures of the constructs in BPD is one that defines impulsive-aggression as a subset of aggressive behaviors, which for any individual may or may not also be accompanied by impulsive traits.

SUMMARY AND IMPLICATIONS

A theory of impulsive-aggression as a single phenotypic trait involving both impulsivity and aggressive behavior finds little support in the present study. Instead, impulsive-aggression seems to be nearly synonymous with simple aggression (perhaps distinguishable from planned aggression, which was not assessed here), and has little association with trait impulsivity. These findings are generally inconsistent with a unidimensional model linking serotonergic functioning to aggressive or impulsive-aggressive behavior through the mediating variable of trait impulsivity, as has been suggested by Coccaro (1992). Staying within the realm of trait-based, biologically-linked theories, the low association between impulsivity and forms of aggression observed in this study appears more consistent with the position taken by Depue and Lenzenweger (2001), who propose that BPD is characterized in part by a co-occurrence of orthogonal dimensions of nonaffective constraint, and negative affect, roughly encompassing control vs. impulsivity and aggression/irritability, respectively.

Overall, these findings are important for a number of reasons. They represent a step forward in understanding relationships between central constructs in BPD. In addition, the relative independence between these particular constructs opens up potential in theory for different clinical correlates, treatment approaches, and responses to treatment for subgroups of BPD patients defined by varying combinations of impulsivity and aggression. An interesting possibility for future research is that there may be differential responsiveness to the same intervention for patient groups defined by combinations of these variables.

Patients who are impulsive only, versus those who are also aggressive, certainly represent different challenges for their treating clinicians. Impulsivity that manifests through excessive spending, sudden changes in choice of career, friends, and so forth, but not through forms of aggression, represents a potentially productive area for exploration in psychotherapy. Such impulsivity does not necessitate the kind of clinical attention, management, or containment that actual or threatened aggression often requires. When significant levels of aggression are present, clinical interventions must focus on containment or amelioration of those behaviors, whether impulsive, planned, or of any other origin, as the highest priority. In certain instances this focus may need to preempt any "deeper" work, and in the extreme cases may require reports to authorities, hospitalization, or interruption of the treatment.

This sample of BPD subjects had high levels of impulsivity, and it might thus be concluded that risk for aggressive behavior, when it exists for this population, should be assessed in the context of that trait. Having said this, mere presence of an impulsive personality *trait* does not necessarily mean that an aggressive patient's hostile *acts* are best characterized as impulsive. The existing literature might contain a bias in regard to this issue whereby aggressive actions are taken to imply a lack of control. For example, Oquendo and Mann (2000) discuss research on BPD suicidal and parasuicidal behavior using this assumptive framework. However, it is also common enough in a clinical context to find that some patients, even BPD patients known to be impulsive in other domains, *plan* aggressive acts (toward self or others) and then sustain, modify, and execute the plan over a period of time. For such patients it may be naïve at best, and dangerously counterproductive at worst, to simply adopt a strategy of enhancing self-control and ability to follow through with plans under the assumption that negative behaviors are always performed impulsively. Instead, an approach involving some consideration of the phenomenology and beliefs underlying any planned aggression, accompanied by attempts to resolve the motivation and provide alternatives, is recommended.

Existing measures developed to tap impulsive aggression (i.e., AIAQ, OASM) ask rather direct questions about various expressions of assaultiveness and irritability, but do not fully assess the context for such behaviors, or the degree of planning or time spent resisting what is otherwise presumed to be related to impulse. Less-than-sensitive operationalization might thus account for some of the observed overlap between general aggression and impulsive-aggression measures, as well as for overall low correlations with impulsivity. Barratt and colleagues (1999) in particular have been careful to separate impulsive from premeditated forms of aggression in their research designs, with interesting results. Their research, however, has typically focused on prison populations and antisocial PD rather than BPD. Better differentiation of planned from unplanned aggression in future BPD research may be necessary to explore for any further potential overlap with impulsivity.

As was alluded to previously, it also may be the case that the picture is more complex than one based primarily on a biologically-based diathesis triggered by salient contextual stressors. Other clinically-relevant moderating variables may need to be taken into account, including variables emphasized by psychosocial theorists, such as the learning history of the BPD patient, the specific circumstances and motivations for behavior, and the patient's phenomenology about triggering events. An underlying biological predisposition toward impulsivity, where present, may be overshadowed on a phenotypic level by a variety of psychosocial, motivational, and learning-based catalysts and constraints for aggressive behavior. If this is the case, one implication for future research is that an expanded model that takes into account psychosocial and cognitive variables along with putative underlying traits and biological predispositions is needed.

LIMITATIONS

The present study is limited somewhat due to use of only self-report (questionnaire and interview) measures, and an exploratory data-analytic strategy. This sample has a high baseline of impulsivity, so low correlations between impulsivity and aggression may have occurred due only to restricted range. Arguing to some degree against this, however, is that standard deviations for the relevant measures were comparable to available norms, and distributions approximated normality. In addition, the observed correlation between MPQ scales of Aggression and Control are also low in non-disordered samples of both male ($r = -0.17$) and female ($r = -0.14$) subjects (Tellegen, 1982). While it is useful to compare the present results with findings in other studies and samples, a weakness of the present investigation is the lack of a relevant clinical control group for direct comparison. As a result, it is unclear the degree to which the present pattern of results may or may not be specific to BPD. Given the small sample size, it would be best for these results to be replicated, preferably using a larger sample, and a contrasting clinical group for comparison. A larger sample could also incorporate measures of psychosocial variables that may be important in an expanded model of BPD.

Finally, although BPD is more prevalent in women, previous research addressing the link between neurobiological variables and impulsive-aggression in personality disordered samples, including BPD, have included a much larger proportion of men than the present study. Coccaro and colleagues (1991) note this potential problem in development of the OASM and AIAQ measures, which primarily involved male subjects. They note that overtly aggressive behavior is more common in male clinical populations overall, and also that 5-HT system functioning in females has not been adequately studied. Further research is thus needed to explore for potential gender differences in the relationship between impulsivity and forms of aggression in BPD, especially given the higher base rate for women of BPD seen in clinical settings. It may be the case that different sets of mediating processes (whether psychological, social, or biological in nature) come into play for each sex. Finally, this study, consistent with other research in this area, primarily addressed aggression directed toward others and did not attempt careful study of self-directed forms of aggression. This will need to be addressed in future research given the central role given to suicide/parasuicide by many theorists.

Additionally, even though BPD has often been emphasized, much of the previous research in this area has been carried out in mixed samples of personality disordered patients, often heavily antisocial, paranoid, and schizotypal as well as presenting for treatment with anger management problems. These mixed samples have made it difficult to determine the role of impulsive aggressive behavior in any one personality disorder, particularly BPD. The present study shows little evidence of a relationship between these constructs in a sample of predominantly *female* BPD patients. It is hoped that the present results will serve to inform and enrich discussion of the role of impulsivity and aggression in BPD, their relationship to one another, and the mechanisms that support their presence.

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