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Impulsivity and Personality Variables in Adolescents with Eating Disorders

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Abstract

Impulsivity among individuals with eating disorders (EDs) is associated with severe comorbidities and poor treatment outcome. However, research investigating the construct of impulsivity in EDs is limited. The objectives of the present study were to characterize multiple dimensions of impulsivity in adolescents with eating disorders (EDs); determine if differences in impulsivity were associated with ED diagnosis and/or broader personality traits; and explore the relationship between impulsivity and etiologically significant variables. Experienced clinicians from a practice-research network provided data on ED symptoms, impulsive characteristics, personality pathology, DSM-IV comorbidity, and family and developmental history for 120 adolescent patients with EDs. Three distinct types of impulsivity were identified: General, Acting Out, and Aggressive/ Destructive. The impulsivity types showed specific relationships to ED diagnosis, broader personality factors, individual histories of adverse (traumatic) events, and family histories of externalizing disorders, supporting the importance of taking assessing and addressing impulsivity in ED research and treatment.

Keywords

eating disorder; adolescence; impulsivity; personality; subtype

Impulsivity is a multidimensional construct that has been variably defined as acting without thinking (Smith, 1952), acting without adequate forethought or conscious judgment (Hinslie & Shatzky, 1940), inability to delay gratification (L'Abate, 1993), and the tendency to act without regard to the potential risks involved (Eysenck, 1993). Most definitions concern action *without planning* or *with little regard for the consequences* (Claes, Vertommen, & Braspenning, 2000). While research suggests that two these elements are at the core of impulsivity and are present across psychiatric disorders (Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001), there may be additional component dimensions specific to particular psychopathologies yet to be explored.

Impulsivity has been the focus of considerable research in the area of eating disorders (EDs). ED pathology may be considered impulsive by nature given an absence of planning or disregard of negative consequences in symptoms such as uncontrolled eating in spite of potential weight gain, overcontrolled eating in spite of unhealthy weight loss, and purging in spite of negative health implications. Empirical studies support the observation that trait impulsivity (i.e., a broader pattern of impulsive thought and behavior) is generally associated with eating pathology (Fischer, Smith, & Anderson, 2003; Wonderlich & Mitchell, 1997). Comparisons between bulimia nervosa (BN) and anorexia nervosa (AN) typically suggest significantly higher impulsivity among individuals with BN (Cassin & von Ranson, 2005). Though the relation between impulsivity and BN is commonly noted (Fahy & Eisler, 1993; Fischer et al., 2003), heightened levels of impulsive behavior are also seen in subgroups of individuals with restricting as well as binge-purging AN (Thompson-Brenner, Eddy, Dorer, Franko, Vashchenko, & Herzog, 2007). Research suggests that behavioral impulsivity and subjective self-control may coexist in restricting AN; individuals with AN may report self-control, but display impulsivity on behavioral measures (Butler & Montgomery, 2004). Moreover, a large minority of individuals with AN engage in or have difficulty with self-injurious or parasuicidal behavior, aggressive outbursts, substance abuse, and kleptomania (Fessler, 2002; Stein, Lilienfeld, Wildman, & Marcus, 2004).

Attempts to compare the levels of trait constructs such as impulsivity between ED and non-clinical samples, and between AN and BN, are compromised by the very considerable within-group heterogeneity for each of the ED diagnoses (see Westen, Thompson-Brenner, & Peart, 2006). Comparisons between ED diagnostic categories are furthermore compromised by symptom overlap and diagnostic crossover; multiple symptoms are shared between diagnoses, and individuals typically move from one ED subtype or diagnosis to another longitudinally over time (Bulik, Sullivan, Fear, & Pickering, 1997; Eddy, Keel, Dorer, Delinsky, Franko, & Herzog, 2002; Milos, Spindler, Schnyder, & Fairburn, 2005), though personality traits are expected to show more stability.

In contrast to research focusing on associations between ED diagnosis and impulsivity, other research accounts for variation in impulsivity via three distinct personality subtypes of EDs that transcend Axis I diagnosis: These include a High-functioning/Perfectionistic type, a Dysregulated type, and a Avoidant/Depressed type (Thompson-Brenner, Eddy, Satir, Boisseau & Westen, in press; Thompson-Brenner & Westen, 2005; Westen & Harnden-Fischer, 2001). The High-functioning/Perfectionistic type is characterized by healthy attributes such as conscientiousness and insight, as well as self-criticism and guilt. The Dysregulated group tends to be lower functioning and is marked by intense emotional reactivity, unstable interpersonal relationships, and attention seeking. The Avoidant/Depressed group is also lower functioning than the first group, and tends to feel depressed, inadequate, and powerless (Thompson-Brenner & Westen, 2005; Westen & Harnden-Fischer, 2001). Additional research is needed to assess whether different manifestations of impulsivity are characteristic of different subtypes, and whether impulsivity generally is more strongly associated with ED diagnosis and symptoms or with stable temperament and personality factors.

The etiology of impulsivity in EDs is multifaceted and appears to include predisposing neurobiological (Brewerton, 1995), genetic, (Strober & Bulik, 2002) and environmental risk factors (Klump, Wonderlich, Lehoux, Lilienfeld & Bulik, 2002). For instance, higher levels of impulsivity in BN have been associated with more pronounced 5-HT abnormalities (Steiger, 2004) leading some researchers to suggest that 5-HT functioning may bridge binge eating and impulsivity neurobiologically (Steiger & Bruce, 2007). Decreased serotonin has also been implicated in restrictive AN (Brewerton, 1995; Goethals et al., 2005) and some researchers have speculated that severe dietary constricting enhances impulsivity via serotonergic mediation (Fessler, 2002).

Research has also highlighted the role of parental externalizing psychopathology in the manifestation of impulsivity in children and adolescents. Externalizing psychopathology has demonstrated strong and consistent association with disinhibitory personality traits such as impulsivity and aggression (Acton, 2003; Lynam, Leukefeld, & Clayton, 2003), and research has supported the intergenerational transmission of a general externalizing liability (Hicks, Krueger, Iacono, McGue, & Patrick, 2004; Young, Stallings, Corley, Krauter, & Hewitt, 2000). More specifically, in a twin family study, Hicks et al. (2004) found that rather than passing on an increased risk for a particular externalizing disorder, parents passed on a highly heritable (approximately 80%) vulnerability to a spectrum of externalizing disorders.

Cross-sectional studies and retrospective studies of impulsivity in EDs also implicate environmental etiological factors, including a history of trauma and childhood sexual abuse (Rorty, Yager & Rossotto, 1994; Wonderlich, Brewerton, Jolic, Dansky, & Abbott, 1997). Individuals with multi-impulsive BN show a greater incidence of childhood trauma including sexual, physical and emotional abuse (Corstorphine, Waller, Lawson & Ganis, 2007; Myers et al., 2006), as do individuals with AN who self-injure or exhibit other impulsive behavior (Paul, Schroeter, Dahme & Nutzinger, 2002). While childhood trauma appears to be an independent risk factor for later self-destructive, impulsive behavior (Wonderlich, Crosby, & Mitchell, 2001), some researchers have demonstrated that parents with externalizing symptoms may place their children at higher risk for childhood abuse (Verona & Sachs-Ericsson, 2005). Findings from observational studies also suggest that the manifestations of personality disturbances, such as heightened emotionality and impulsivity, in EDs may be moderated by family dysfunction or environments lacking warmth and stability (Steiger & Bruce, 2007; Schmidt, Humfress & Treasure, 1997).

Within the population with EDs, multiple studies suggest that higher impulsivity is associated with negative treatment outcome (Keel & Mitchell, 1997; Westen et al., 2006). For example, individuals with multi-impulsive bulimia nervosa (BN) (i.e., those who also demonstrate non-ED impulsive behaviors such as substance abuse, self-injury, sexual disinhibition, and stealing) show greater treatment utilization and a more negative prognosis than those with BN who are less impulsive (Fischer et al., 2003).

Though the research reviewed above suggests impulsivity is prevalent across the ED diagnoses, and shows important relationships to behavioral symptoms, course, and outcome, there has been little research directly investigating the full spectrum of impulsivity

evidenced by individuals with EDs. In the current investigation, we sought to better describe and define the types of impulsivity in an adolescent ED population, and investigate the relationships between impulsivity, ED diagnosis, and personality. More specifically we address the following questions: 1) Are there multiple, distinct types of impulsivity in adolescents with EDs?; 2) Do adolescents with EDs differ by DSM-IV diagnoses with regard to impulsivity characteristics?; 3) What is the relationship between impulsivity, ED diagnosis and the three different personality styles identified in prior research?; and 4) What is the relationship between adverse life events and parental externalization in impulsivity?

Method

As in other studies of personality pathology in EDs (e.g., Thompson-Brenner & Westen, 2005), we used a practice network approach, in which experienced clinicians provide data on patients that can be aggregated across large samples (Morey, 1988; Westen, Dutra, & Shedler, 2005). The rationale for utilizing this method is describe briefly below, however detailed rationale can be found elsewhere (e.g., see Shedler & Westen, 2004; Thompson-Brenner & Westen, 2005). The main advantage of this method is that clinicians are experienced observers, with skills and a normative basis which informs their abilities to make inference and recognize nuances in different forms of psychopathology. One of the central objections to this method pertains to potential influence of observer bias in clinical judgments; however, research suggests that clinicians tend to make valid and reliable judgments when their observations are psychometrically quantified (Westen & Muderrisoglu, 2003; Westen, Muderrisoglu, Fowler, Shedler, & Koren, 1997; Westen & Weinberger, 2004). Evidence for validity of clinician-report personality data is also supported by large correlations between treating clinicians' independent interviewers' assessments of a range variables (e.g., correlations ranging from $r = .50$ to $r = .80$) (Westen & Muderrisoglu, 2003; 2006; Westen et al., 1997), and its ability to predict adaptive functioning, attachment patterns, and family and developmental history variables (Dutra, Cambell, & Westen, 2004; Westen, Shedler, Durrett, Glass & Martens, 2003). Moreover, when clinicians are asked to describe specific patient characteristics that are quantified by using psychometric instruments, clinician training (e.g., psychiatry vs. psychology) or theoretical orientation predicts little variance in the description of clinical phenomena (Shedler & Westen, 2004).

Sample

The practice research network was developed as part of a NIMH-funded study of adolescent personality pathology in which researchers contacted a random national sample of psychiatrists and doctoral-level psychologists with at least 5 years experience from the membership registers of the American Psychiatric and American Psychological Associations, who indicated an interest in clinical work with children or adolescents. For this study, which is part of a larger investigation of personality subtypes in adolescents with EDs (Thompson-Brenner et al., in press), we re-contacted members of the practice research network by letter briefly describing the study and patient subject criteria, and inviting them to participate. The recruited clinicians were not necessarily experts in eating disorders, and did not necessarily have individuals with EDs in their practice. Out of 850 randomly-

selected clinicians contacted, 426 indicated willingness to participate, for an overall response rate of 54%. Of these clinicians, 191 (22%) responded that they were currently treating a female patient between 15-18 years old with an eating disorder; of these, 65% (n = 124) returned the measures complete. Four subjects were excluded due to incorrect subject selection or otherwise unsuitable data. The procedure required approximately 3 hours of time and clinicians received a consulting fee of \$200 for their participation.

Clinicians were asked to describe “a female adolescent patient between the ages of 15-18 with an eating disorder.” Clinicians were instructed to select a patient whose personality was well known to them, i.e., whom they had seen for more than 3 sessions, but whom they had seen less than 1 year (to minimize confounds imposed by personality change with treatment). The only exclusion criteria were chronic psychosis and mental retardation. Clinicians received a packet containing the following items: a cover letter; a consent form; a postage-paid return envelope; and the study measures. Clinicians provided informed consent for their study participation, however, to avoid compromising patient confidentiality or interfering in any way with ongoing clinical work, clinicians provided no identifying information about the patient. To minimize rater-dependent variance, if a clinician had more than one patient meeting study criteria they were directed to describe the patient they saw most recently.

Measures

Clinicians were administered a battery of questionnaires. Here we describe those of relevance to the current report.

Impulsivity Questionnaire (Imp-Q)—The Imp-Q is a comprehensive 50-item questionnaire generated from the clinical literature on impulsivity in personality and eating disorders. Clinicians are asked to rate each item on a 7 point Likert-type scale from 1 (*not at all typical*) to 7 (*extremely typical*). The impulsivity questionnaire was recently developed for an NIMH-funded study of personality pathology in adolescents, and adapted for this study to sample a broad range of impulsive cognitions, behaviors, and characteristics. Scale development was an iterative process, intended to compile a comprehensive list of impulsive characteristics for exploratory research such as this study. Items were gathered from a broad range of sources, such as the criteria for attention deficit disorder, cognitive screening measures, regularly observed adolescent behaviors, etc. In preliminary research, clinicians were asked to provide feedback about whether the measure comprehensively described adolescent patients, and were asked to suggest additional items, which were then reviewed and added if justified. The final adapted scale had a Cronbach's alpha value of .96 in the current study.

Adolescent Eating Symptom Form—ED symptoms and diagnoses were assessed using a comprehensive eating symptom form that listed each criterion of the three ED diagnoses (bulimia nervosa [BN], anorexia nervosa [AN], and eating disorder not otherwise specified [EDNOS]), including frequency and duration criteria, to allow for independent accurate diagnosis by the researchers.

Clinical Data Form for Adolescents (CDF-A)—The CDF-A is a clinician-report form developed over several years that provides information on clinician and patient demographics and includes a checklist of common Axis I comorbid diagnoses, including diagnoses assigned primarily in childhood and adolescence (e.g., Westen & Shedler, 1999; Westen et al., 2003). The CDF-A also assesses a wide range of variables of potential etiological relevance (e.g., history of foster care, family stability, physical/sexual abuse) as well as patient developmental and family history, including histories of common internalizing and externalizing disorders (e.g., mood, anxiety, and personality disorders) in close relatives. Prior studies using this method suggest that clinicians tend to make judgments on developmental and family history variables using appropriately conservative decision rules which predict theoretically relevant criterion variables (Russ, Heim & Westen, 2003; Wilkinson-Ryan & Westen, 2000). Although we do not assume that every data point provided by every clinician is reliable, research suggests that these data tend to be accurate when aggregated and produce correlations with other variables similar to those found in other methods (Nakash-Eisikovits, Dutra, & Westen, 2002). In keeping with prior studies and to maximize reliability, we aggregated variables to provide composite descriptions of externalizing pathology, adverse life events, and family functioning.

Shedler-Westen Assessment Procedure for Adolescents—(SWAP-II-A; Westen et al, 2005). The SWAP-II-A (formerly the SWAP-200-A) is a Q-sort measure that has been validated in multiple studies of adolescent personality (see Westen et al., 2003; 2005). The SWAP-II-A includes 200 statements regarding aspects of adolescent personality. Clinician-subjects receive a deck of SWAP-II-A Q-sort cards, instructions for sorting, a return envelope, and a set of eight small envelopes with a pile number marked on each (from 0-7) in which to place the cards once they have sorted them. Prior studies of adults and adolescents with eating disorders using the SWAP adult and adolescent versions have indicated that at least three distinct personality subtypes exist in eating disorders (Westen & Harnden-Fischer, 2001; Thompson-Brenner et al., in press), including Dysregulated, Avoidant/Depressed, and High-Functioning types.

Q-factor analysis of the SWAP produces three variables reflecting the degree to which an individual subject matches three personality subtypes of eating disorders. The personality prototypes were developed in an earlier study using the same sample (see Thompson-Brenner et al., in press). To identify personality subtypes we Q-factor analyzed the SWAP-II-A, replicating the procedure used in Western & Harnden-Fischer's (2001) adult study. While computationally similar to factor analysis, Q-factor analysis transposes the data matrix so that patients rather than items are factored; this creates clusters of patients with similar pathology rather than clusters of items. To determine the personality prototypes we followed standard factor-analytic procedure by running a Principal Component Analysis using the scree plot and percent of variance accounted for to determine the number of factors to rotate. Notably, four SWAP items directly related to eating disorder symptoms were omitted prior to analysis. Using Principal Axis Factoring with a Promax rotation ($\kappa = 2$), we then rotated 3-5 factors and determined that the first 3 factors of a 4-factor solution provided the most robust solution. The fourth factor was not retained because of high item overlap and small amount of additional variance (3.2%) explained. Thus the analyses

reported here reflect the following 3 factors, which accounted for 37.5% of the variance: 1) High-functioning/Perfectionistic, characterized by personal and interpersonal strengths as well as the tendency to be perfectionistic and self-critical; 2) Emotionally Dysregulated, characterized by extreme emotionality, unstable, and self-destructive relationships and behaviors; and 3) Avoidant/Depressed, characterized by self-blame, and unassertiveness as well as feelings of depression, powerlessness and anxiety. While the 3-factor solution only accounted for 37.5% of the variance in the personality measure, a large majority of individuals in the sample were well-described using one of the three personality types. The q-factor analysis indicated that 100 of our 120 subjects loaded above .4 on at least one of the three personality types. The apparently low percentage of variance accounted for is important to take into consideration, however. Use of the SWAP results in a 200-item description of each individual, and traditional factor analysis of this measure can result in 20 or more different scales with eigenvalues above 1, reflecting different aspects of personality styles and levels of functioning (e.g., tendency to anxiety, tendency to psychoticism, poor insight into others and relational functioning, narcissism, confusion over sexual orientation, etc.). Though there are many dimensions on which a subject's personality may vary, we attempted here to identify "types," and these three types reflected moderately good to excellent descriptions of 83.3% of the individuals' overall personality.

Individual personality scores are calculated for the three personality types by correlating every 200-item individual swap profile with the characteristic prototype SWAP profile for the cluster derived through the q-factor analysis, above, using a MANOVA function and retaining the SPSS-derived scores representing each subject's scores for each personality type. Personality prototype scores were only minimally associated with ED diagnosis, suggesting the mean score reflecting Dysregulated personality was slightly but significantly lower in the AN subsample than the BN or EDNOS subsamples (see Thompson-Brenner et al., in press). No significant mean differences emerged in High-Functioning or Avoidant/Depressed scores between groups defined by ED diagnosis (AN, BN, and EDNOS).

Data analysis

All statistical analyses were performed using SPSS (version 12.0 for Windows). To aggregate the impulsivity variables (assessed in the Imp-Q) we ran a Principal Components Analysis using a Varimax rotation, extracting components with eigenvalues > 1, and using the variance explained and scree plot to determine the number of factors to rotate. We used Pearson product-moment correlations and Spearman's correlations as appropriate given normality assumptions to assess the associations between our impulsivity factors, a range of criterion variables, and personality prototype scores. Next, we performed a series of ANOVAs to examine potential differences in impulsivity and personality across ED diagnostic categories. We then conducted hierarchical multiple regression predicting each impulsivity factor using personality pathology as the independent variables, holding ED diagnoses constant. To ensure the constructs did not overlap, one item on the Imp-Q pertaining directly to eating disorder symptoms was omitted prior to analysis and two items directly related to impulsivity were also removed from the SWAP prior to analysis. Finally, we conducted a series of zero-order and partial correlations to examine specific hypothesis about etiologically significant variables and our impulsivity factors.

Results

Sample Characteristics

The sample included 120 clinicians who reported on adolescent patients with eating pathology. With regard to clinician variables, 68.6% of clinicians were psychologists, and the remainders were psychiatrists. Fifty-one percent were female. Analyses yielded no differences between psychiatrists and psychologists, suggesting that neither professional training nor differential response rates significantly biased the pattern of findings. Clinicians averaged 21.7 (8.5) years of clinical experience post-training. Patients averaged 16.5 years of age ($SD = 1.2$; range 15-18). Fifteen percent of the sample was diagnosable with AN ($n=18$); 36.7% with BN ($n=44$); and 47.5% with EDNOS ($n=57$); notably, one patient was excluded from further analyses because not enough information was provided to make a valid diagnosis. The majority of patients were middle or upper middle class (82.5%) and the sample was predominantly Caucasian (90.8%). Patients had been seen by the responding clinician an average of 8.3 months ($SD = 4.5$), with the length of treatment ranging from 1-26 months. The range indicates that at least one clinician did not follow the directions for inclusion criteria. In fact, there were ten clinicians who had seen patients between one and two years. However, these were not clear outliers, as they fell on a continuum between 12 and 26 months. We decided to include these subjects in spite of the longer length of treatment, as they did not appear to be markedly different from other data in other respects.

The mean pre-treatment GAF score for the sample was 51.3 ($SD = 8.6$). ED diagnostic groups showed significant differences in pre-treatment GAF scores, ($F(3,120) = 4.41$, $p = 0.005$), where patients with AN had the lowest scores ($M = 46.6$, $SD = 13.3$) and those with BN the highest ($M = 54.0$, $SD = 10.2$). Axis I mood and anxiety disorder comorbidity was common in the sample. The most common axis I diagnoses were major depressive disorder (37.5%); dysthymia (45.8%); obsessive compulsive disorder (18.3%); and panic disorder (10.8%). Externalizing disorders including attention deficit hyperactivity disorder (10.0%), substance use disorders (9.2%), and oppositional defiant disorder (9.2%) were present in a significant minority. Approximately 10.1% met criteria for a learning disability.

Impulsivity factors

To identify possible distinct types of impulsivity in the sample, to reduce the data, and to maximize reliability of measurement of distinct constructs, we ran a Principal Components Analysis (PCA) on the 50 impulsivity items in the Imp-Q. Table 1 shows selected items from the Imp-Q that best characterize each factor. The first component appeared to represent a general impulsivity factor and was best characterized by acting without thinking, jumping to conclusions, and difficulty inhibiting actions. The second component appeared to represent acting out behaviors and was best characterized by promiscuity, substance abuse, thrill-seeking behavior, and criminal activity. The final component appeared to represent an aggressive, destructive impulsivity and was comprised of verbal abusiveness, angry outbursts, and physical assault. In total, these three factors accounted for 52.5% of the variance in the measure.

Using a cut-off of loadings of .6 or above on the PCA to identify characteristic items, the General Impulsivity scale includes 18 items, the Acting Out Scale included 9 items, and the Aggressive/Destructive Scale included 8 items. For the purposes of preliminary validation, we used Cronbach's alpha to assess internal consistency of our impulsivity scales. As expected, alpha values were high: .96 for the General Scale; .92 for the Acting Out Scale; and .91 for the Aggressive/Destructive Scale. As another means of assessing the validity of our impulsivity scales, we also conducted *t*-tests and correlations for a range of criterion variables, which should be theoretically associated with particular impulsivity scales and where sample sizes permitted such analyses. Significant mean differences were found on the General Impulsivity scale in the patients diagnosed with attention deficit hyperactivity disorder ($M = 4.28$, $SD = 1.51$) and those without that diagnosis ($M = 3.06$, $SD = 1.18$), $t(118) = 3.31$, $p = .001$. Mean differences on the Destructiveness scale were also found in regards to oppositional defiant disorder (ODD) diagnosis; patients diagnosed with ODD scored higher ($M = 4.12$, $SD = 1.28$) than patients not diagnosed ($M = 2.09$, $SD = 1.04$), $t(118) = 6.06$, $p < .001$. Destructive impulsivity was also significantly associated with physical fighting ($r_s = .29$, $p = .001$). On the Acting Out scale mean differences were also observed, with significantly higher mean scores in adolescences who abused substances ($M = 3.50$, $SD = 1.34$) than those who did not ($M = 1.89$, $SD = 1.08$), $t(118) = 4.60$, $p < .001$. Significant associations were also observed between the Acting Out scale and patients having been arrested ($r_s = .23$, $p = .017$) and clinician-rating of patient promiscuity ($r_s = .58$, $p < .001$). For subsequent analyses of the relationships between impulsivity and personality, however, we used the PCA scores for each component retained by SPSS, rather than individually calculated scale scores, because SPSS-derived scores are more precisely weighted according to factor loadings.

To examine associations between our impulsivity factors and ED diagnosis, a one-way ANOVA was conducted. Significant differences emerged across ED diagnostic categories with respect to General Impulsivity, $F(2,117) = 4.31$, $p = .016$; and Acting Out, $F(2,117) = 3.47$, $p = .03$. Post-hoc analyses revealed that the BN group had higher levels of General Impulsivity and Acting Out than the AN group ($p < .05$) and no significant differences were found between AN or BN and EDNOS. No significant mean difference in Destructiveness was found across ED diagnostic category (Table 2).

Impulsivity and personality

To examine associations between impulsivity and personality subtypes, zero-order Pearson's correlation were conducted. The High-functioning/Perfectionistic group was negatively associated with all types of impulsivity, whereas the Dysregulated group showed positive association with all types of impulsivity. The Avoidant/Depressed group was negatively associated with both Acting Out and Destructiveness, but positively associated with the General Impulsivity factor. Table 3 shows these associations. Because of the known relationship between major depression and components characterizing our General Impulsivity factor, such as sustained attention (Tancer et al., 1990), we ran a series of correlations to assess the possible influence of depression on the observed associations. The presence of major depression was positively associated with the General Impulsivity factor ($r = .289$, $p = .001$), however showed no significant association to Acting Out or

Destructiveness. We then ran a partial correlation controlling for major depression to delineate whether the positive association found between the Avoidant/Depressed personality prototype and the General Impulsivity factor was above and beyond that accounted for by major depression. After controlling for the presence of major depression, the same association reached only the trend level of significance ($r = .176, p = .057$), indicating that a substantial proportion of the association was accounted for by the depressive aspects of this personality type.

We were also interested in looking at whether personality style afforded us incremental validity in predicting impulsivity factor scores above and beyond the importance of eating disorder diagnosis. Therefore we ran a series of hierarchical multiple regressions to predict General Impulsivity, Acting Out, and Destructiveness, including eating disorder diagnosis (AN or BN) alone in the first step, and adding personality style in the second (Table 4). AN and BN were considered, and EDNOS was not included in the model due to multi-collinearity. Similarly, the dysregulated and avoidant/depressed personality styles were considered and the high-functioning/perfectionistic style was not included in the model due to high levels of inter-correlation. The two pathological styles were also selected because they were more normally distributed than the high-functioning style. In all cases the models including personality were more predictive than eating disorder diagnosis alone, suggesting that impulsivity was closely linked to broader patterns of thinking and feeling in addition to specific ED psychopathology.

Impulsivity and family variables

In our final series of analyses, we ran zero-order correlations to examine the association between the prevalence of internalizing or externalizing disorders in parents with our impulsivity factors. We then examined the association between our impulsivity factors and an aggregate variable representing adverse life events in childhood (the sum of 0/1 ratings of the incidence of traumatic separations, witnessing domestic violence, 4+ geographical moves, physical abuse, sexual abuse, divorce, and death of a parent). The results are presented in Table 5. As shown, externalizing disorders but not internalizing disorders in first degree relatives were associated with both Acting Out and Destructiveness. Adverse events also demonstrated a positive association with Acting Out. After running a partial correlation controlling for the presence of an externalizing disorder in a parent, the presence of adverse events in childhood remained significantly related to Acting Out ($r = .236, p = .011$). Additionally, after controlling for the presence of adverse events, parental externalization remained significantly associated with Acting Out ($r = .188, p = .043$).

Discussion

The present study sought to characterize patterns of impulsivity in an adolescent ED population. Our findings suggest that the impulsivity evident in many ED patients can be organized into coherent factors including General Impulsivity, Acting Out, and Destructiveness. General impulsivity is characterized by general cognitive and behavioral elements of impulsivity that have been observed over time, namely, characteristics such as acting without thinking or failing to organize thought and action. Acting Out (or thrill

seeking) through sexual or substance related behaviors is a second construct, distinguishable from the third more destructive and aggressive type of impulsivity. The high loadings of characteristic items (and concurrently high alpha values for a factor comprised of these items), as well as distinctive patterns of relationships to other variables discussed below, suggest that these three impulsivity constructs warrant further investigation in ED research.

Consistent with prior research, our data indicated that patients with BN show higher general levels of General Impulsivity and Acting Out than patients with AN (Claes et al., 2002; Sansone, Levitt & Sansone, 2005). However, our data also suggested that impulsivity differs more consistently according to personality type than ED diagnosis. Multivariate analyses indicated that personality styles explained additional variance at above and beyond what could be explained by ED diagnosis alone, suggesting the importance of considering broader personality styles when investigating impulsivity in EDs. As noted earlier, prior examinations of impulsivity in eating disorders have largely focused on comparisons between ED diagnoses, generally finding that individuals with binge/purge symptoms are more impulsive than those without (Cassin & von Ranson, 2005). However, these analyses suggest that there are differences in impulsivity within diagnostic categories that are associated with broader characteristic patterns of thinking and feeling. Analyses of General Impulsivity suggested that, though AN and BN were associated with General Impulsivity, they were no longer significantly associated variance attributable to general patterns of borderline-type dysregulation or avoidant/depression were accounted for. Analyses of Acting Out and Aggressive/Destructive types of impulsivity indicated that ED diagnosis did not account for significant variance, but general personality functioning did. These general patterns may require significant attention in treatment separately from intervention regarding ED symptoms.

We found that a personality style characterized by emotional dysregulation was positively associated with all types of impulsivity, whereas a personality style characterized by minimal personality pathology (and perfectionism) was negatively associated with impulsivity in general. This is consistent with prior research which links poor emotional control with maladaptive personality styles and impulsivity (Skodol, Siever, Livesley, Gunderson, Pfohl & Widiger, 2002). Further research is required to understand whether mood dysregulation leads to impulsive action primarily through a mechanism such as emotional avoidance, or whether general patterns of cognitive and attentional impulsivity predispose individuals to the development of mood dysregulation (or both factors influence each other bidirectionally). Longitudinal and mediational research is needed in this area, and our results suggest this research may be important to understanding the development of EDs in a subgroup of individuals.

This research also suggests that an Avoidant/Depressed personality style is positively associated with general impulsivity, but negatively associated with both Acting Out and Destructiveness. This relationship appears to be accounted for in part by the concentration and attention problems which are symptoms of major depressive disorder. Individuals with this personality style may engage in impulsive (though not self-destructive or thrill-seeking) action to escape distressing emotion, or engage in cognitive avoidance to escape distressing

thoughts. However, trend-level results tentatively suggest an avenue for future exploration on the role of major depression in the general impulsivity seen in the in this personality type.

As with prior studies, family and childhood developmental variables demonstrated important relationships with impulsivity (Corstorphine et al., 2007; Schmidt et al., 1997). The presence of externalizing pathology (such as substance abuse disorder or criminality) in a parent showed positive relation to Acting Out and Destructiveness in the adolescents in our sample, suggesting a possible genetic predisposition to impulsivity in this population. In addition, however, higher numbers of childhood adverse life events (such as sexual abuse and parental loss) accounted for unique variance in Acting Out impulsivity, suggesting that negative life experiences may also contribute to these impulsive patterns. The possibility that these two factors had no independent effects—i.e., that having impulsive parents simply left one vulnerable to experiencing adverse events—was contradicted by the finding that each of these associations remained significant when controlling for the other variable. These intriguing results suggest several possibilities. For example, it is possible that there is both a genetic route to developing an impulsive variant of an ED, as well as a second environmental route to a similar outcome. It is also possible that these are interacting forces, such that a genetic vulnerability in combination with adverse or traumatic events yields these outcomes. Other recent highly influential studies have suggested that gene-by-environment interactions effects such as these may be crucial areas of investigation in the future (Caspi et al., 2003; Steiger & Bruce, 2007).

It is also important to consider these findings from a developmental standpoint. Experts in this area have traditionally suggested caution in describing personality pathology among adolescents, and current version of the Diagnostic and Statistical Manual of Mental Disorders (*DSM-IV-TR*; American Psychiatric Association, 2000), has suggested personality disorders should not be diagnosed before age 18, given the possibility that apparently pathological patterns may simply represent incompletely developed regulation capacities that will change with maturity. Observations regarding personality types in adolescent and adults provide some support for this caution. For example, as we have reported elsewhere, the High-Functioning and Dysregulated types observed in adolescents with EDs were very similar to those observed using similar methods with adults; however, the depressed/avoidant type observed in adolescence showed differences from the more obsessional and constricted type observed in adults (Thompson-Brenner et al., in press). It remains to be seen (ideally via longitudinal methods) whether the obsessional and constricted characteristics are the outcome of long-term patterns of depression and avoidance, or whether instead patterns of treatment referral account for these observations—for example, whether obsessional and constricted adolescents are less likely to be referred for treatment than more anxious and depressed adolescents, who manifest more obvious distress and problems in functioning. Prior longitudinal studies of adolescents with eating disorders have found significant stability in pathological personality traits (impulsivity and obsessionality) from adolescence through adulthood, and have reported that pathological traits in adolescence predict long-term outcome (e.g., Gillberg, Rastam, & Gillberg, 1995; Rastam, Gillberg, & Wentz, 2003). Though it is possible that adolescents who are healthy in other ways, but have immature personality traits, might develop more mature personality over time, it is also possible that

adolescents who suffer from a major axis I disorder such as an eating disorder might have more difficulty achieving more functional patterns of emotion regulation and behavioral stability in the course of growth.

Limitations of this investigation also deserve consideration. Although the findings were clear and theoretically consistent, they are limited by the absence of an empirically validated impulsivity measure. Though the research was in part prompted by the absence of reliable and valid measures of impulsivity, additional analyses are needed to establish the validity of this measure through comparison to other better-known self-report measures like the Dickman Impulsivity Inventory; (Dickman, 1990) and behavioral indices such as the Go/No-go Task (Newman, Widom, & Nathan, 1985) or the Delay-discounting task (Richards, Zhang, Mitchell, & de Wit, 1999). Additionally while we were able to identify three coherent impulsivity factors on the Imp-Q which showed distinct and meaningful relationships to other variables, they only accounted for 52.5% of the variance. The variance accounted for was largely attributable to item loadings between .4 and .7 on their factor. A few items were not as well as accounted for by the factor score, as they had slightly lower loadings on their highest-loading factor. These items included impulsive buying or stealing (.32 on Acting Out) and a tendency to make up ones mind quickly (loading at approximately .3 on all three factors). Thus, some variables assessed on the Imp-Q may be less systematically characteristic of adolescents with EDs. Future research is needed to help clarify whether these dimensions are relevant to personality and functioning in this population, and to identify and investigate other possible components of impulsivity in adolescent EDs.

It is also important to consider the limitations of clinician-report methodology. Data for each patient were provided by a single observer, the treating clinician. Although psychiatric research often relies on information obtained from a single informant (most commonly utilizing patient self-report, in questionnaires or interviews), future research collecting independent data from multiple informants is necessary. The validity of clinician observation of certain types of impulsivity may be limited by observations made solely in the clinical setting, although assessments of impulsivity (via attention and hyperactivity assessment) are routinely included in child and adolescent clinical assessment. Clinician-report and the use of a practice-care network, however, provides important avenue for investigation that complements the patient-self report data found elsewhere.

The generalizability of our sample is also worth examining. Consistent with other studies (Thompson-Brenner & Westen, 2005), the overall number of clinicians treating adolescent EDs in the community appears to be low; only 22% of the clinicians willing to participate indicated they had an adolescent patient with an ED. It is possible that the smaller number of individuals who treat EDs share some particular bias in the way they report symptoms, personality traits or other variables. Among the clinicians with patients meeting study criteria, a high number were willing to participate, and the majority of those completed the study. However, it is possible that the clinicians who elected not to complete the study (or their patients) differed in some systematic way from those who completed the study.

Although the present study suggests the role of personality style in the impulsivity seen in eating disorder patients, future research is needed to clarify these relations. Specifically, future investigations should include a more comprehensive assessment of impulsivity and include client-report, independent observation, and behavioral measure in addition to clinician report. Given the interest in delineating the relationship between impulsivity and eating pathology, it would be important to assess these prospectively over the course of eating disorder treatment and recovery. Additionally, to definitively address the etiological role of personality style in the development of eating and impulsivity symptoms, longitudinal data are needed.

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Table 1

Principal Components Analysis: Impulsivity Factors (N = 119)

General Impulsivity	Factor Loading
Trouble imaging consequences	0.77
Acts w/o thinking when not distressed	0.74
Gives up easily	0.73
Jumps to conclusions	0.73
Analyses superficially	0.71
Minimal persistence	0.71
Acts w/o thinking when distressed	0.70
Difficulty breaking down problems	0.69
Acts quickly to escape unpleasant feelings	0.69
Difficulty considering the complexity of a situation	0.68
Trouble planning	0.67
Makes major life choices without forethought	0.67
Pays little attention to details	0.67
Needs immediate gratification	0.65
Difficulty using "self-talk" to inhibit responses	0.63
Trouble imagining others point of view	0.63
Difficulty concentrating	0.63
Distractible	0.62
Acting Out	
Promiscuity	0.75
Alcohol abuse	0.75
Unprotected sex	0.74
Engages in quick and intense relationships	0.71
Emotional involved with others she knows are "trouble"	0.71
Engages in thrill-seeking behavior	0.65
Difficulty inhibiting destructive acts when peers are committing them	0.65
Commits criminal acts to impress peers	0.64
Abuses illicit substances	0.63
Aggressive/Destructive	
Verbally abusive	0.80
Responds aggressively when shamed	0.79
Trouble inhibiting aggression	0.74
Breaking things when angry	0.74
Prone to angry outbursts	0.72
Physically assaults others	0.65
"Blurts things out" w/o thinking	0.64

Table 2
Comparison of Means on Personality and Impulsivity Scores for Eating Disorder Diagnostic Groups (ANOVA)

	AN M (SD)	BN M (SD)	EDNOS M (SD)	Test Statistic	p
Personality Type ^a					
High-Functioning	.38 (.24)	.30 (.25)	.36 (.36)	F (2,116)=.887	.42
Dysregulated	-.09 (.19)	.17 (.23)	.12 (.27)	F (2,116)=7.26	.001
Avoidant-Depressed	.37 (.20)	.33 (.24)	.30 (.23)	F (2,116)=.56	.58
Impulsivity Factor ^b					
General	-.41 (.91)	.32 (1.0)	-.11 (.95)	F (2,117)=4.31	.016
Acting Out	-.28 (.68)	.31 (1.0)	-.14 (1.0)	F(2,117)=3.48	.034
Aggressive-Destructive	-.03 (.71)	-.22 (1.2)	.21 (.93)	F(2,117)=2.27	.108

^aMean Score (SD)= High-Functioning .34(.27); Dysregulated .11(.26); Avoidant-Depressed .32 (.23).

^bMean Score (SD)= General -.01(1.0); Acting Out .00(1.0); Aggressive-Destructive .01 (1.0).

Table 3

Correlations between personality prototypes and impulsivity factors (N = 119)

	General	Acting Out	Aggressive/Destructive
High-functioning	−0.54 ^{***}	−0.22 [*]	−0.30 ^{**}
Dysregulated	0.48 ^{***}	0.35 ^{***}	0.45 ^{***}
Avoidant-Depressed	0.24 ^{**}	−0.34 ^{***}	−0.41 ^{***}

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

Table 4

Predicting impulsivity factors from eating diagnoses and personality styles using hierarchical linear regression (N = 114)

	R	R²	Standardized β	F change (model) or t (β)	P F² change or coefficient
General Impulsivity					
Model 1 (ED Diagnosis)	0.33	0.11		6.69	0.002
AN			-0.52	-2.07	0.04
BN			0.51	2.77	.007
Model 2 (ED diagnosis + personality)	0.65	0.42		19.82	<0.001
AN			-0.05	-0.24	NS
BN			0.09	1.616	NS
Dysregulated			0.58	6.87	<0.001
Avoidant/depressed			0.43	5.52	<0.001
Acting Out					
Model 1	0.12	0.01		0.83	NS
Model 2	0.43	0.19		6.28	<0.001
.....AN			-0.01	-0.05	NS
.....BN			-0.01	-0.11	NS
Dysregulated			0.28	2.83	.005
Avoidant/depressed			-0.25	-2.74	.007
Aggressive/Destructive					
Model 1	0.05	0.00		0.15	NS
Model 2	0.53	0.28		10.99	<.001
AN			0.10	1.19	NS
BN			-0.10	-1.22	NS
Dysregulated			0.41	4.40	<0.001
Avoidant/depressed			-0.27	-3.20	.002

Table 5

Impulsivity Factors, Parental Externalization and Adverse Life Events (N = 118)

	General	Acting Out	Aggressive-Destructive
Externalizing d/o in Parent	-0.93	-0.21 *	-0.20 **
Adverse Events Aggregate	0.02	-0.27 **	-0.16

**
p < .01*
p < .05