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A Path Model of Different Forms of Impulsivity with Externalizing and Internalizing Psychopathology: Toward Greater Specificity

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Abstract

Objectives—A growing empirical literature indicates that emotion-related impulsivity (compared to impulsivity that is unrelated to emotion) is particularly relevant for understanding a broad range of psychopathologies. Recent work, however, has differentiated two forms of emotion-related impulsivity: A factor termed Pervasive Influence of Feelings captures tendencies for emotions (mostly negative emotions) to quickly shape thoughts. A factor termed Feelings Trigger Action captures tendencies for positive and negative emotions to quickly and reflexively shape behavior and speech. The current study used path modeling to consider links from emotion-related and non-emotion-related impulsivity to a broad range of psychopathologies.

Design and Methods—Undergraduates completed self-report measures of impulsivity, depression, anxiety, aggression, and substance use symptoms.

Results—A path model ($N = 261$) indicated specificity of these forms of impulsivity. Pervasive Influence of Feelings was related to anxiety and depression, whereas Feelings Trigger Action and non-emotion-related impulsivity were related to aggression and substance use.

Conclusions—The findings of this study suggest that emotion-relevant impulsivity could be a potentially important treatment target for a set of psychopathologies.

Keywords

impulsivity; urgency; psychopathology; aggression; anxiety; depression

Considerable research indicates that impulsivity is a transdiagnostic risk factor for a broad range of psychopathologies. Indeed, it has been suggested that impulsivity might be the most frequently occurring diagnostic criterion within the DSM (Whiteside & Lynam, 2001). Impulsivity, however, is a broad umbrella term (Depue & Collins, 1999), and research suggests that different forms of impulsivity, such as difficulties with sensation-seeking,

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ability to delay gratification, to persevere toward difficult to attain goals, and to think before acting, are only modestly correlated (Whiteside & Lynam, 2003). More importantly, these different forms of impulsivity have been shown to have only modest overlap in their ties to behavioral or psychopathology outcomes (Sharma, Markon, & Clark, 2014).

In one major factor analysis of impulsivity measures, Whiteside and Lynam (2003) found that tendencies to respond to emotion states in a highly impulsive manner could be differentiated from other forms of impulsivity. A growing body of work suggests that this form of impulsivity may be particularly important for understanding daily behavioral problems (Sharma, Markon, & Clark, 2014), neurocognitive correlates of impulsivity (Johnson, Tharp et al., 2016), and psychopathology (Cyders & Smith, 2008; Johnson, Carver et al., 2013; Whiteside & Lynam, 2003). For example, impulsive reactivity to emotions has been found to be uniquely related to a broad range of externalizing and internalizing problems such as aggression, alcohol use problems, anxiety, depression, eating disorder symptoms, and borderline personality disorder (Berg, Litzman et al., 2015; Carver, Johnson et al., 2013; Dick, Smith et al., 2010; Johnson et al., 2013; Magid & Colder, 2007; Miller, Flory et al., 2003; Pawluk & Koerner, 2013; Peters, Upton et al., 2013; Whiteside, Lynam et al., 2005). A tendency to overreact to positive feelings in particular—called positive urgency—has also been related to vandalism, risky sexual behavior, gambling, and drug use (Cyders, Smith et al., 2007; Zolowski, Cyders et al., 2009), and bipolar disorder (Muhtadie, Johnson et al., 2013).

Despite these associations, several gaps exist in our understanding of the tie between this form of impulsivity and psychopathology. An important issue is that psychopathologies are highly comorbid. Little research has considered whether links of impulsivity with some psychopathologies might be secondary to the links of impulsivity with other syndromes. To address this, we construct a multivariate model to conjointly consider multiple outcomes.

A second gap is in the understanding of the nature of emotion-related impulsivity. In recent work on this topic, two factor-analytically distinct forms of emotion-related impulsivity have been identified and distinguished from impulsivity for which emotions do not play an obvious role (Carver, Johnson et al., 2011). One emotion-related factor was termed Pervasive Influence of Feelings. It centers on the extent to which (mostly negative) emotions influence the person's orientation to the world, mostly in automatic cognitive responses. Another factor was termed Feelings Trigger Action. This one centers on impulsive reactivity that is mostly behavioral and is affected by both positive and negative emotions (Carver et al., 2011).

Both of these factors have also been found to be correlated more robustly with key outcomes than non-emotion-related forms of impulsivity were, including aggression, borderline personality traits, depression, suicidality, and manic symptoms (Auerbach, Stewart et al., 2016; Carver et al., 2013; Johnson et al., 2013). Despite overlap in the validity of the emotion-related impulsivity factors, early studies suggest that it may be important to distinguish between these two factors in understanding psychopathology. That is, there is some evidence that Pervasive Influence of Feelings is more relevant for internalizing conditions such as depressive symptoms, whereas Feelings Trigger Action is more robustly

related to externalizing conditions and hypomanic symptoms (Johnson, Carver, & Joormann, 2013). In another study, Pervasive Influence of Feelings was tied to suicidal ideation, whereas Feelings Trigger Action was tied to suicidal actions (Auerbach, Stewart, & Johnson, 2016). These findings validate the idea that the two forms of impulsivity differentially guide difficulties with thoughts versus actions in the face of emotion. As that evidence comes from only two datasets, however, there is a need for further evidence pertaining to the differential associations of these forms of impulsivity with psychopathologies.

In sum, the goal of this study was to re-consider how two aspects of emotion-related impulsivity, as well as non-emotion-related impulsivity, relate to a set of psychopathological syndromes. To do so, we assessed internalizing syndromes of anxiety and depression, along with externalizing syndromes of aggression and substance use. Participants completed measures of emotion-related and emotion-unrelated impulsivity, and we used path modeling to test unique associations between impulsivity factors and psychopathology symptoms. We predicted that all types of psychopathology symptoms would show closer associations with emotion-related impulsivity than with emotion-unrelated impulsivity, and that links of Pervasive Influence of Feelings, with its emphasis on poor constraint over emotion, would be stronger for problems that more directly involve moods (anxiety, depression), whereas links of Feelings Trigger Action, with its emphasis on poor constraint over behavior and motivation, would be more strongly related to problems that involve behavior, such as aggression and substance use. We examined these hypotheses in a large undergraduate sample, given evidence that rates of psychopathology, substance abuse, and impulsivity are particularly elevated during early adulthood (Hasin et al., 2005; Grant, Hasin, et al., 2005; Hunt & Eisenberg, 2010; Roberts, Walton, & Viechtbauer, 2006).

Method

Participants

The sample consisted of undergraduate students at a large public university in the US. Analyses presented here were based on participants ($N=261$) who had completed most the questionnaires and responded correctly to catch items (e.g. “Please answer “Agree” for this question”). Six participants failed to complete most of the questionnaires, and another four participants were excluding for answering four or more of the seven “catch items” incorrectly. When we repeated the analyses including participants with missing data, results remained essentially the same, with no changes in the significance or general magnitude of results. Participants in the final sample (69.3% female, age $M=20.77$, $SD=2.65$) described their ethnicities as follows: 33% Asian-American, 23% Caucasian, 12% Hispanic/Latino, and 19% as other; ethnicity responses were missing from 3% of the sample.

Participants earned partial credit toward a requirement in psychology courses for taking part in the study. All procedures were approved by the university’s Institutional Review Board.

Measures

Table 1 shows descriptive statistics and sample items for all measures. Multiple indices of anxiety, depression, and aggression were gathered, and then used in constructing composite variables for these three dimensions.

Impulsiveness—Participants were administered a broad range of measures of impulsivity that had been previously found to represent three underlying factors, two of which pertain to impulsive reactivity to emotions, and one of which does not. These scales were derived from previously developed impulsivity scales, supplemented with new item sets (see Carver et al., 2011 for scale development). The first factor (labeled Pervasive Influence of Feelings) centers on the extent to which (mostly negative) emotions influence the person's orientation to the world. Scales loading primarily on this factor were Negative Generalization (Carver, 1998), and items reflecting tendencies to become immobilized by sadness, to have Emotions Color One's Worldview, and to have an Inability to Overcome Lethargy (Carver et al., 2011); other scales that cross-loaded on this factor include Negative Urgency (Whiteside & Lynam, 2001) and Laziness (Jackson, Wood et al., 2010).

Factor 2 (labeled Lack of Follow-Through) is composed of scales that do not reference emotion. Scales loading primarily on this factor were Lack of Perseverance (Whiteside & Lynam, 2001), (Lack of) Self-control (Tangney, Baumeister et al., 2004), Laziness (Jackson et al., 2010), and Distractibility (Carver et al., 2011), though Inability to Overcome Lethargy and Positive Urgency (Cyders et al., 2007) also cross-loaded onto this factor.

Factor 3 (labeled Feelings Trigger Action) centers on impulsive behavioral actions and speech to both positive and negative emotions. Scales loading primarily on this factor were Reflexive Reaction to Feelings (Carver et al., 2011), an abbreviated version of the Positive Urgency Measure (Cyders et al., 2007), and an abbreviated version of the Negative Urgency scale (Whiteside & Lynam, 2001). Previous work has replicated the factor structure of scales (Auerbach, Stewart, & Johnson, 2016).

Responses on most scales were made from options ranging from 1 = *I agree a lot* to 5 = *I disagree a lot*; response options for the Laziness scale were 1 = *Never* to 5 = *Very often*. Scales were standardized, and factor scores were constructed using the previously published factor loadings to weight the contributing scales (Carver et al., 2011).

Anxiety—Anxiety was measured by two anxiety subscales from the *Mood and Anxiety Symptoms Questionnaire (MASQ)*: General Distress Anxiety Symptoms, designed to assess indicators of anxious mood such as inability to relax; and Somatic Arousal, which covers symptoms that are related to anxiety and physiological arousal, such as dizziness, trembling, and being easily startled. The MASQ was developed to help differentiate symptoms that are specific to anxiety and depression from those that are common to both syndromes, such as insomnia and poor concentration, and was constructed based on the tripartite model (Clark & Watson, 1991). We used the 62-item short version (Watson, Weber et al., 1995). Participants were asked to rate the severity of each symptom during the past week on a scale of 1 = *not at all* to 5 = *extremely*, and items were summed within each subscale. The MASQ subscales have been validated against other measures of anxiety, depression, and

psychopathology (Watson, Weber, et al., 1995). A composite score was calculated by standardizing the two scales and then averaging them ($\alpha = .86$).

Depression—Depression was measured by the *MASQ General Distress Depression* and the *MASQ Anhedonia subscales*, the *Inventory to Diagnose Depression (IDD)*, and the *7-Up 7-Down Depression subscale*. The MASQ General Distress Depression subscale covers symptoms related to depressed mood, including self-blame and pessimism; and the MASQ Anhedonia subscale covers symptoms such as loss of interest and decreased positive affect. Both the MASQ depression subscales have been shown to differentiate patients and non-patients (Watson, Clark, et al., 1995).

The IDD is a self-report measure designed to assess symptoms of lifetime depression (Zimmerman & Coryell, 1987). Items cover 9 major symptoms of major depressive disorder that are included in the DSM criteria for major depressive disorder (e.g., guilt, hopelessness, decreased energy, loss of interest, and suicidality). Symptoms were rated on a 5-point scale, ranging from no endorsement (i.e. “My appetite was not greater than normal” = 0) to complete endorsement (i.e. “I felt hungry all the time” = 4). For each item endorsed, participants were asked whether the symptom was present for at least two weeks. IDD scores were a sum of the number of symptoms endorsed out of 10. The scale has been found to correlate highly with interview-based and other self-report measures of depression (Hodgins, Dufour et al., 2000) and to differentiate those who do and do not meet diagnostic criteria for major depressive disorder according to structured clinical interviews (Uehara, Sato et al., 1997).

The 7-Up 7-Down scale is a self-report scale that was designed to assess current manic (7 items) and depressive symptoms (7 items). In this study, we used the 7-Down subscale. Items were drawn from the General Behavior Inventory (Depue, 1987) using factor analysis and were validated against diagnoses and a set of personality and other correlates of mood disorders (Youngstrom, Murray et al., 2013). Respondents answered on a scale of 1 = *never or hardly ever* to 4 = *very often or almost constantly*. The total score is the sum of depression items (possible range 7 to 28).

A mean of the standardized scores was used as a composite index of depression. Depression subscales correlated as expected with the total depression composite score (α based on subscale totals = .73).

Aggression—Aggression was measured by three subscales of the *Aggression Questionnaire – Short Form (AQ)* and by two subscales from *Subscales of Antisocial Behavior (STAB)*. The AQ – Short Form was developed by Bryant and Smith (2001) by removing items with reverse wording and low loadings or multiple loadings from the AQ (Buss & Perry, 1992). We used subscales (with 3 items each) of Anger, Physical Aggression, and Verbal Aggression, and omitted Hostility, which is conceptually distinct and showed only moderate correlations with the other subscales. The AQ subscales have been shown to elevated in individuals with severe psychopathology diagnoses, as well as suicide and narcissism (Barnett & Powell, 2016; Johnson & Carver, 2016; Menon, Sarkar, et al., 2015). Respondents answered on a scale ranging from 1 = *extremely uncharacteristic of me* to 5 =

extremely characteristic of me. Items for each subscale were averaged. Because it was inadvertently not included for initial participants, $n = 239$ for the AQ.

The STAB is a self-report questionnaire that includes factor-analytically distinct subscales; of these, we used Physical Aggression (9 items) and Social Aggression (11 items) subscales and omitted Rule-breaking (11 items) behaviors (Burt & Donnellan, 2009). Participants responded on a scale ranging from 1 = *never* to 5 = *nearly all the time*. Scores for each subscale were created by summing the items. Each of the STAB subscales predict characteristic acting-out behaviors, such as gossip (Social Aggression) or feeling like hitting someone (Physical Aggression; Burt & Donnellan, 2010), and effectively differentiates offenders of violent crimes and substance users from normative groups (Burt & Donnellan, 2009). STAB Physical Aggression subscale is correlated with high impulsivity and negative affectivity (Burt & Donnellan, 2009).

A composite score was calculated by taking the mean of the five standardized scales. Subscales correlated adequately with this composite score (α based on subscale totals=.78).

Substance Use—Substance use was measured by the *Substance Use Questionnaire*, which was designed to measure the types of substances used, as well as problems due to that substance use (e.g., missing work or school, social or legal problems, and physical withdrawal) during the past year. The Frequency subscale includes items (derived from two-item conjoint screen (TICS) by Brown, Leonard et al. (2001)) which is focused on the frequency of use of 10 specific classes of substances (e.g., alcohol, stimulants, dissociatives, opioids, etc.; 1 = *never*, 2 = *1–2 times*, 3 = *2–3 times*, 4 = *3–4 times* to 5 = *greater than 5 times*). The Substance problems subscale includes 11 items based on the Rapid Alcohol Problems Screen (RAPS; Cherpitel, 2000). Both substance use scales are well-validated and show high sensitivity in identifying problem drinking across gender and race (Brown et al., 2001; Cherpitel, 1998). A composite score comprising the average of the two z-transformed subscales was used, $\alpha = .62$. Substance use problems have been found to correlate with emotion-related impulsivity (Latzman, Chan et al., 2013), but comparable correlations have been observed with non-emotionally relevant forms of impulsivity (Berg et al., 2015; de Wit, 2009; Latzman et al., 2013).

Procedure

After informed consent procedures, participants completed the questionnaires just described. A subset of these participated in individual laboratory-based assessments after completing questionnaires, which have been reported previously (*References to be filled in after blind review*).

Data Analysis

Data were analyzed using AMOS in a structural equation modeling (SEM) framework (e.g., Kline, 2005). As indicators of model fit, we inspected the χ^2 statistic (known to be affected by sample size and therefore not of primary interest), the Comparative Fit Index (CFI; using a cut-off value of $> .90$ following Hu & Bentler, 1999), and the Root Mean Square Error of Approximation (RMSEA; using $< .08$ as an indicator of fit following Browne & Cudeck,

1993). Alpha was set to .05, and all analyses were two-tailed. All variables were z-standardized.

Data reduction—To test the viability of our psychopathology measurement model, we first conducted an exploratory factor analysis using principal component analysis (PCA) with Varimax rotation. Results provided initial support for the measurement model. Specifically (see Table 2), the PCA yielded four factors with anxiety subscales loading on factor 3, depression subscales loading on factor 2, substance use subscales loading on factor 4, and aggression subscales loading on factor 1. Factor cross-loadings were generally low, except for the MASQ general distress depressive symptoms subscale, which showed a substantial cross-loading on factor 3, reflecting shared method variance with the MASQ anxiety subscales. Somewhat lower cross-loadings were shown for MASQ General Distress Anxiety, which loaded dominantly on factor 3 and modestly on factor 2, and for STAB Social Aggression, which loaded dominantly on factor 1 and modestly on factor 3.

We then conducted a confirmatory factor analysis using SEM with four correlated factors (i.e., anxiety, depression, substance use, aggression) and accounting for shared method variance within the MASQ, AQ, and STAB subscales. The resulting model showed acceptable fit, $\chi^2(55) = 105.82$, $p < .001$, CFI = .96, RMSEA = .064, with high factor loadings (i.e., anxiety subscales: .63–.85; depression subscales: .63–.95; substance use subscales: .54–.67; aggression subscales: .53–.84).

Hypothesis tests—Hypothesis tests were conducted in an SEM framework using path modeling (Kline, 2005). This analysis included only observed variables (no latent variables, to maintain a reasonable parameter-to-case ratio) and allows for including multiple explanatory and outcome variables in the same model. In this path model, the three impulsivity factors were included as (correlated) explanatory variables and the four psychopathology syndromes were included as outcome variables (with significantly correlated error terms included in the model). Regression paths were included between the explanatory and outcome variables.

First, we examined associations between the impulsivity factors and psychopathology syndromes by inspecting all regression paths in the path model. Second, where links of emotion-related impulsivity with psychopathology were significant, we tested whether associations were significantly larger than those for the emotion-unrelated impulsivity factor with psychopathology, using χ^2 tests.

Follow-up analyses—In follow-up analyses we examined whether results (1) remained stable when controlling for gender (i.e., by including gender as a correlated predictor in the path model and examining stability of the regression paths) and (2) generalized across gender (i.e., by using multi-group modeling following Byrne, 2010 and examining whether a model in which a regression path was constrained to be equal across men and women showed significantly worse fit, χ^2 , $p < .05$, than a model in which this regression path was unconstrained across men and women). When a significant difference in model fit emerged, we examined this regression path separately for men and women. We conducted multi-group modeling for each regression path separately to allow for targeted tests.

Results

Preliminary Analyses

Descriptive statistics of key variables are shown in Table 1. For all variables, skewness and kurtosis were below the recommended thresholds (skewness > 3, kurtosis > 10; Kline, 2005). As shown in Table 3, all impulsivity and psychopathology variables were correlated with each other, $p_s \leq .001$. Depression was highly related to anxiety. Each of the three impulsivity scores was significantly related to each psychopathology syndromes in bivariate correlations, with particularly strong correlations of Pervasive Influence of Feelings with Anxiety, Depression, and Aggression, as well as (Lack of) Follow Through with Depression, and Feelings Trigger Action with Aggression.

Impulsivity Factors as Predictors of Psychopathology Syndromes

We used SEM to examine the unique associations between the impulsivity factors and psychopathology syndromes (see Table 4 and Figure 1). The final path model fit the data well, $\chi^2(2) = 1.49, p = .474, CFI = 1.00, RMSEA = .000$. Results revealed substantial specificity: Impulsivity Factor 1 (Pervasive Influence of Feelings) was positively related to anxiety and depression composite scores. Impulsivity Factor 2 (Lack of Follow-Through) and Factor 3 (Feelings Trigger Action) both positively predicted the aggression and substance abuse composite scores. In contrast with bivariate analyses, Factor 3 (Feelings Trigger Action) related to modestly lower depression composite scores. The remaining associations were nonsignificant, $p_s > .05$.

Comparing Emotion-Related and Emotion-Unrelated Impulsivity as Predictors of Psychopathology Syndromes

We examined whether the unique associations between emotion-related vs. emotion-unrelated impulsivity factors and psychopathology syndromes significantly differed from each other using χ^2 tests. In these analyses, Factor 1 Pervasive Influence of Feelings showed a significantly stronger association than (the nonsignificant) Factor 2 Lack of Follow-Through in relation to both anxiety, $\chi^2(1) = 10.05, p = .002$ and depression, $\chi^2(1) = 28.78, p = .001$. The Factor 2 Lack of Follow-Through and Factor 3 Feelings Trigger Action did not differ significantly from each other for either aggression, $\chi^2(1) = 2.02, p = .155$, or for substance abuse, $\chi^2(1) = .03, p = .853$.

Analyses of Gender

First, we examined whether results remained stable when controlling for gender. Results indicated that associations between impulsivity factors and psychopathology syndromes remained stable when controlling for gender, with two minor changes: The association between Factor 1 Pervasive Influence of Feelings and aggression became significant rather than a nonsignificant trend, $B = .19, SE(B) = .08, p = .019$, and the association between Factor 2 Lack of Follow-Through and aggression was reduced to a nonsignificant trend, $B = .14, SE(B) = .08, p = .071$.

Second, we examined whether findings generalized across gender using multi-group modeling. Most associations between impulsivity factors and psychopathology syndromes

were not moderated by gender, $\chi^2, ps > .05$, with two exceptions. The association between Pervasive Influence of Feelings and depression was moderated by gender, $\chi^2(1) = 4.60, p = .032$, such that the association was stronger for women, $B = .79, SE(B) = .08, p < .001$, than men, $B = .46, SE(B) = .12, p < .001$. The association between Feelings Trigger Action and anxiety was also moderated by gender, $\chi^2(1) = 5.03, p = .025$, such that the association was significant for women, $B = -.18, SE(B) = .06, p = .002$, but not for men, $B = .03, SE(B) = .08, p = .693$.

Discussion

Previous work had suggested that tendencies toward impulsive thoughts in response to emotion were particularly relevant to depression and suicidal ideation, whereas impulsive actions in response to emotion were particularly relevant to psychopathologies involving behavioral concerns, such as externalizing syndromes. Here, we tested whether we could observe this differentiation for internalizing and externalizing syndromes (i.e., anxiety, depression, aggression, and substance use) using a multivariate path model. Multivariate findings showed that one emotion-related impulsivity factor, Pervasive Influence of Feelings, was uniquely related to depression and anxiety syndromes, whereas the other emotion-related factor, Feelings Trigger Action, was uniquely tied to substance use problems and aggression.

We hypothesized that the non-emotion impulsivity factor, Lack of Follow-Through, would be less robustly related to psychopathology than emotion-related impulsivity, but this was only partially supported. The associations of Pervasive Influence of Feelings with anxiety and depression were significantly stronger than those for Lack of Follow-Through. The effect of Lack of Follow-Through, however, did not differ significantly from the magnitude of the Feelings Trigger Action effect on either substance abuse or aggression scores. Although Feelings Trigger Action was positively correlated with depression at the bivariate level, consistent with previous results (Carver et al., 2013; Ceschi, Billieux et al., 2014; d'Acremont & Van der Linden, 2007; Gonzalez, Reynolds et al., 2011; Miller et al., 2003), once the other forms of impulsivity were controlled for, it instead was related to modestly lower depression. Apparently the variance the three impulsivity factors shared with one another acted as a suppressor of that unique effect.

A substantial body of research has shown that impulsivity is a transdiagnostic risk factor for a wide range of psychopathological syndromes and disorders (Berg et al., 2015; Johnson et al., 2013; MacKillop, Amlung et al., 2011; Moeller, Barratt et al., 2001). Our results fit well with prior findings and add considerable specificity in two ways. First, converging with previous theoretical and empirical work (Berg et al., 2015; Carver et al., 2013; Cyders & Smith, 2008; Johnson et al., 2013; Smith, Fischer et al., 2007; Smith, Guller et al., 2013; Whiteside et al., 2005), we found that the emotion-related impulsivity factors contributed more strongly to predicting symptoms of depression and anxiety than did the non-emotion-related impulsivity factor. This converges with theoretical propositions and empirical work suggesting that emotional dysfunction constitutes one of the building blocks of psychopathology (Johnson et al., 2013; Kring & Sloan, 2010; Levenson, Sturm et al., 2014; Rottenberg & Johnson, 2007), as reflected in the prominence of emotion dysfunction in the

Research Domain Criteria framework (RDoC; Morris & Cuthbert, 2012). The current work highlights emotion-related impulsivity as an important feature of this emotional dysfunction (Carver et al., 2013).

Second, our findings show important specificity between the two emotion-related impulsivity factors. Specifically, Pervasive Influence of Feelings (Factor 1) showed a unique significant positive relationship to internalizing symptoms (although a link with aggression emerged as well, when controlling for gender); in contrast, Feelings Trigger Action (Factor 3) showed significant positive relationships to externalizing symptoms, as did Lack of Follow Through (Factor 2). This finding supports the common distinction between internalizing and externalizing syndromes and suggests considerable specificity at the level of impulsivity-related antecedents. Factor 1 includes tendencies toward overly general cognitive responses to negative emotions, as well as behavioral responses such as lethargy. Factor 3 covers a tendency for both positive and negative emotions to quickly and reflexively shape action and speech. Factor 2 concerns impulsivity without reference to emotion states. These findings suggest that depression and anxiety symptoms appear more distinctly related to difficulties in constraining how emotion influences thought, whereas externalizing symptoms appear related to difficulties in constraining how emotion influences behavior and to problems with impulsivity that occur without regard to emotion.

It should be noted that poor constraint appears to be the critical issue here, rather than intensity of emotional response. That is, previous work has shown that persons with emotion-related impulsivity do not have elevated emotional responses per se to standardized stimuli (Johnson, Tharp, et al., 2016). There is also evidence that impulsive responses to emotion are more predictive of psychopathology than are tendencies to be emotional per se (Kaiser, Milich, et al., 2012).

One more thing should be noted about the present results. We have emphasized the differentiation between the two emotion-related impulsivity factors and their differential unique associations with internalizing versus externalizing symptoms. Although this is important, we should also note that the SEM results do not place focus on the variance that is shared among the predictors. It is clear from the correlations in Table 3 that shared variance among the predictors plays a large role in accounting for variance in symptoms. The SEM results reveal what remains after that shared effect has been removed. We would highlight that shared effects are not trivial.

Limitations

Before considering implications, it is important to note several limitations. First, people may consider their previous experiences of symptoms experiences when evaluating their sense of control over their emotion responses. This problem may be amplified by our reliance entirely on self-report scales, with the possibility that common method variance exaggerates the strengths of effects. The relatively modest internal consistency of our psychopathology scales should also be noted, as unreliability would constrain the magnitude of effects. It will be important to assess the profile of findings using behavioral measures of impulsivity, administered during periods of high emotion. Although current findings dovetail with prior findings linking emotion-triggered impulsivity to diagnoses of anxiety and depression

(Johnson et al., 2013; Miller et al., 2003), it will be important to assess the generalizability of these transdiagnostic effects in a patient sample and to validate that they predict related deficits in functioning. Previous work suggests that the neurocognitive correlates of emotion-related impulsivity may be more pronounced in clinical samples (Johnson, Tharp et al., 2016), and so generalizability to clinical samples should not be assumed. Despite the importance of testing generalizability across samples, however, it is worth noting that recent work suggests that prevalence of psychopathology in undergraduate samples approximates that in the general population (Burt & Donnellan 2009; Hunt & Eisenberg, 2010; Ibrahim, Kelly, et al., 2013). Finally, the cross-sectional design limits ability to comment on whether impulsivity operates as a vulnerability factor.

Conclusions

Despite limitations, the current findings highlight that emotion-related impulsivity may be a key facet of psychopathology. Given the large literature suggesting that impulsivity is an important risk factor that can prospectively predict the onset and progression of disorders (Alloy, Bender, et al., 2009; Bauer, Meyer, et al., 2015), it is hoped that more specific understanding of which facets of impulsivity are particularly important for different syndromes could be applied in developing predictive models of psychopathology.

Understanding the importance of emotion-related impulsivity in these symptom clusters also helps form a bridge to other risk factors in psychopathology. A growing body of research links emotion-relevant impulsivity with genetic, neural, developmental, and neurocognitive processes, which have implications for treatment. That is, emotion-relevant impulsivity has been related to the serotonin transporter gene (Carver et al., 2011; Carver, LeMoult et al., 2014; Haase et al., 2015), to cortical thinning (Hoptman, Antonius et al., 2014), reduced right-frontal activity (Gable, Mechin et al., 2015), to early adversity (Carver et al., 2011), and to response inhibition (Bagge, Littlefield et al., 2013; Gay, Rochat et al., 2008; Roberts, Fillmore et al., 2011; Rochat, Beni et al., 2013; Wilbertz, Deserno et al., 2014). To the extent that early life experiences coupled with neurobiologically-based deficits drive these traits, this could be considered in treatment planning.

If these findings generalize to patient samples, it will be important for clinicians to consider assessing more specifically whether patients have particular problems with impulse control during periods of high emotion and whether those problems take the form of poor constraint over cognitive, motivational, or behavioral domains. Persons with these difficulties could receive tailored interventions to focus on strategies that can be easily used during those specific moments. Considerable research suggests that emotion regulation depends on the same neurobiological pathways that are engaged during other kinds of cognitive control (Ochsner, Silvers, & Buhle, 2012); thus, interventions that enhance control, such as cognitive remediation strategies, may be helpful. Behavioral strategies that promote tolerance of emotion before acting, as well as emotion regulation (Linehan, 2014), warrant further testing for this form of impulsivity as well.

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Practitioner Points

- Recent work has differentiated two forms of emotion-related impulsivity.
- This study tests a multivariate path model linking emotion-related and non-emotion-related impulsivity with multiple forms of psychopathology.
- Impulsive thoughts in response to negative emotions were related to anxiety and depression.
- Impulsive actions in response to emotions were related to aggression and substance use, as did non-emotion-related impulsivity.
- The study was limited by the reliance on self-report measures of impulsivity and psychopathology.
- There is a need for longitudinal work on how these forms of impulsivity predict the onset and course of psychopathology.

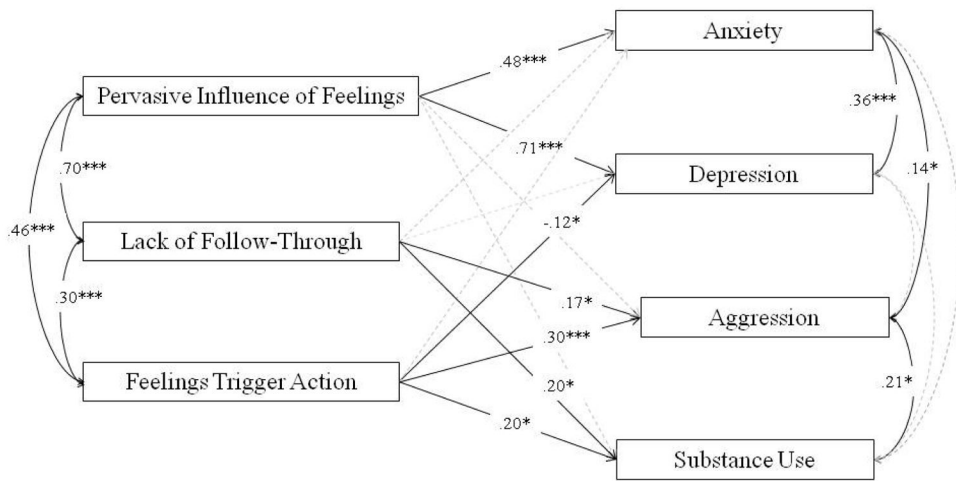


Figure 1.

Impulsivity and psychopathology symptoms.

Note. Standardized regression coefficients (β) shown. Bold lines indicate significant associations ($p \leq .05$). Dashed lines indicate nonsignificant associations ($p > .05$).

* $p < .05$. *** $p < .001$.

Table 1
Descriptive Statistics and Sample Items of Individual Impulsivity and Psychopathology Measures

Measure	Number of items	Mean (SD)	Alpha	Sample Item
<i>Impulsivity</i>				
Pervasive Influence of Feelings	46	0.138 (2.69)	.82	"My feelings greatly affect how I see the world."
Lack of Follow Through	64	0.057 (2.54)	.70	"Unfinished tasks really bother me." (reverse coded)
Feelings Trigger Action	25	0.004 (1.22)	.68	"When I am upset I often act without thinking"
<i>Anxiety</i>				
MASQ General Distress Anxiety	11	24.48 (7.43)	.85	"Felt afraid"
MASQ Somatic Arousal	17	25.55 (9.35)	.90	"Startled easy"
<i>Depression</i>				
MASQ General Distress Depression	12	26.16 (10.89)	.94	"Blamed myself for a lot of things"
MASQ Anhedonia	22	62.40 (13.96)	.91	"Felt like nothing was very enjoyable"
7-Up 7-Down Depression	7	12.77 (5.13)	.94	"Have there been periods lasting several days or more when you were so down in the dumps that you thought you might never snap out of it?"
IDDD	22	2.66 (2.86)	.89	"My appetite was not greater than normal"
<i>Aggression</i>				
AQ Anger	3	6.13 (2.76)	.73	"I have trouble controlling my temper"
AQ Physical Aggression	3	4.82 (2.36)	.67	"I have threatened people I know"
AQ Verbal Aggression	3	7.34 (3.02)	.82	"I often find myself disagreeing with people"
STAB Physical Aggression	9	15.02 (5.27)	.86	"Felt like hitting people"
STAB Social Aggression	11	21.79 (6.75)	.89	"Tried to hurt someone's feelings"
<i>Substance Use</i>				
Substance Use Frequency	40	1.38 (.41)	.68	"In the past year, how many times have you used each of these [types of drugs] per month?"
Substance Use Problems	11	0.53 (1.58)	.90	"During the previous 12-month period, I have experienced a persistent desire or unsuccessful effort to cut down or control my use of a substance."

Note. AQ = Aggression Questionnaire; IDDD = Inventory to Diagnose Depression; MASQ = Mood and Anxiety Symptom Questionnaire; STAB = Subscales of Antisocial Behaviors.

The AQ was only available for 239 persons due to experimenter error.

Table 2

Psychopathology Measures: Results from Principal Components Analysis

	Factor 1	Factor 2	Factor 3	Factor 4
MASQ General Distress Anxiety	.130	.355	.850	.097
MASQ Somatic Arousal	.109	.159	.863	.138
MASQ General Distress Depression	.099	.615	.640	.074
MASQ Anhedonia	.084	.812	.112	-.022
IDD	.073	.783	.153	.111
7-Up 7-Down Depression	.155	.837	.250	.073
AQ Anger	.814	.256	-.048	.066
AQ Physical Aggression	.784	.060	.111	.137
AQ Verbal Aggression	.777	.108	-.075	.095
STAB Physical Aggression	.809	.007	.259	.101
STAB Social Aggression	.639	.010	.392	.132
Substance Use Problems	.106	.141	.098	.813
Substance Use Frequency	.205	-.012	.111	.783

Note. Rotated component matrix (Rotation method: Varimax with Kaiser Normalization).

AQ = Aggression Questionnaire; IDD = Inventory to Diagnose Depression; MASQ = Mood and Anxiety Symptom Questionnaire; STAB = Subscales of Antisocial Behaviors.

Table 3
Intercorrelations of Impulsivity and Composite Psychopathology Measures (N = 261)

	1.	2.	3.	4.	5.	6.
1. Pervasive Influence of Feelings	-					
2. Lack of Follow Through	.70	-				
3. Feelings Trigger Action	.46	.30	-			
4. Anxiety	.50	.36	.21	-		
5. Depression	.72	.55	.23	.58	-	
6. Aggression	.40	.36	.42	.30	.27	-
7. Substance use	.24	.27	.25	.23	.21	.33

Note. All correlations are significant at the level of $p < .001$.

Table 4

Impulsivity and Psychopathology: Results from Path Model (N = 261)

Impulsivity	Psychopathology	B	SE(B)	p
Pervasive Influence of Feelings (Factor 1)	Anxiety	.48	.08	< .001
	Depression	.71	.06	< .001
	Aggression	.15	.08	.064
	Substance Use	.01	.09	.933
Lack of Follow Through (Factor 2)	Anxiety	.03	.08	.707
	Depression	.09	.06	.141
	Aggression	.17	.08	.028
	Substance Use	.21	.08	.012
Feelings Trigger Action (Factor 3)	Anxiety	-.01	.06	.768
	Depression	-.12	.05	.015
	Aggression	.30	.06	< .001
	Substance Use	.19	.07	.004

Note. Unstandardized regression coefficients.