

Parsing the Heterogeneity of Impulsivity: A Meta-Analytic Review of the Behavioral Implications of the UPPS for Psychopathology

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The construct of impulsivity is implicated in a wide variety of psychopathology. However, the heterogeneous factors or subcomponents that differentially predict outcomes are still in the process of being parsed. The present review and meta-analysis focuses on the psychopathological correlates of the Negative Urgency, (lack of) Premeditation, (lack of) perseverance, Sensation Seeking, and Positive Urgency (UPPS/UPPS-P; Whiteside & Lynam, 2001), which provides a relatively new model of impulsivity that posits 5 potentially overlapping pathways to impulsive action. The present meta-analysis included 115 studies that used the UPPS, with a total of 40,432 participants. Findings suggested that the Negative Urgency pathway to impulsivity demonstrated the greatest correlational effect sizes across all forms of psychopathology, with the Positive Urgency pathway demonstrating a pattern of correlations similar to that of Negative Urgency. These findings raise questions regarding the conceptual and practical separability of these pathways. Lack of Premeditation and Lack of Perseverance also demonstrated similar correlational patterns, suggesting that further investigation of the distinctiveness of these pathways is warranted.

Keywords: impulsivity, disinhibition, UPPS, UPPS-P, meta-analysis

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Impulsivity is a broad construct associated with poor planning skills, difficulty maintaining attention, and risk-taking behavior. In addition to being highly heterogeneous, impulsivity has been the subject of a great deal of terminological and conceptual confusion, including both the “jingle” and “jangle” fallacies (Block, 1995).¹ Impulsivity, disinhibition, and sensation seeking, in particular, have come to comprise what we might term a “jingle-jangle triad”: In different models, any of these labels may be defined as the superconstruct umbrella in which the other labels are contained (e.g., Colder & Chassin, 1997; Eysenck & Zuckerman, 1978; Gorenstein & Newman, 1980; for reviews of these overlaps, see Carver, 2005; Eysenck & Zuckerman, 1978; Nigg, 2000; Sharma, Markon, & Clark, 2014; Zuckerman, 1996). However, regardless of the terms used to describe this construct, impulsive behaviors are highly relevant to models of broad personality as well as to a crosscutting swath of psychopathology.

Impulsivity has been extensively studied for decades, both in terms of its overlap with personality dimensions (e.g., the “Big Three” models put forward by Eysenck & Eysenck, 1975; Tellegen, 1985; and Watson & Clark, 1993, as well as the “Big Five” model of Costa & McCrae, 1992) and its pervasive associations with diverse forms of psychopathology in both children and adults. For example, impulsivity has been implicated in externalizing symptoms (e.g., aggression, alcohol and substance abuse; Latzman & Vaidya, 2013; Lejuez et al., 2010; Miller, Flory, Lynam, & Leukefeld, 2003; Zapolski, Settles, Cyders, & Smith, 2010), internalizing symptoms (e.g., anxiety, depression; Cyders & Coskunpinar, 2011; d’Acremont & Van der Linden, 2007), eating disorders (Miller et al., 2003; Waxman, 2009; Zapolski et al., 2010), attention-deficit/hyperactivity disorder (ADHD; Miller, Derefinko, Lynam, Milich, & Fillmore, 2010; Miller et al., 2003; Zapolski et al., 2010), and some personality disorders (e.g., borderline personality disorder [BPD], antisocial personality disorder, psychopathy; Miller et al., 2003; Poythress & Hall, 2011; Zapolski et al., 2010). Nevertheless, the very use of the term “impulsivity” implies that this concept refers to a single entity. Yet what we commonly call impulsivity may be an umbrella concept that refers to several conceptually and empirically separable traits.

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¹ The “jingle” fallacy refers to situations in which different constructs are given the same label; the “jangle” fallacy refers to situations in which the same constructs are given different labels.

Some of the early research on impulsivity was based on the ideas that impulsivity (a) is largely orthogonal to anxiety or neuroticism, and (b) is multidimensional (e.g., Barratt, 1965; Stanford et al., 2009). These conceptualizations guided the construction of the Barratt Impulsiveness Scale (BIS; e.g., Patton, Stanford, & Barratt, 1995), which is sometimes regarded as the quintessential measure of impulsivity. These ideas also helped to spawn the development of Gray's psychobiological model of personality, including his behavioral inhibition and behavioral activation (or approach) systems (BIS/BAS; Gray, 1981, 1987), which has informed an immense body of research (e.g., Carver & White, 1994; Fowles, 1980, 1987).

Both of these ideas—the orthogonality of impulsivity and anxiety, and the multidimensional nature of impulsivity—have, in general, been borne out empirically. Impulsivity is associated most strongly with low agreeableness (high antagonism) and low conscientiousness from the five-factor model (FFM; McCrae & Costa, 1987), but is largely orthogonal to neuroticism (Watson, Clark, & Harkness, 1994). Nevertheless, the lattermost conclusion must be tempered by the fact that within the influential FFM, impulsivity is commonly viewed as a lower-order facet of neuroticism (McCrae & Costa, 1987), raising further questions regarding the nature and heterogeneity of impulsivity. Moreover, numerous studies suggest that different facets of impulsivity are related to different behaviors and disorders (e.g., Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001).

The number of dimensions that compose impulsivity is perpetually in dispute, ranging from as few as two to as many as 15 (Kirby & Finch, 2010). This varying number may stem in part from traits being differentially represented based on item selection or item construction for any given instrument. In turn, these item selection decisions may lead to differential representations of the factor space of impulsivity itself. Across models, some of the facets of impulsivity have included (reversed) inhibition and activation-approach systems (e.g., Gray, 1987), as well as risk- or thrill-seeking, nonplanfulness, and distractibility or divertibility (Carver & White, 1994; Kirby & Finch, 2010). A recent meta-analysis examined self-report as well as laboratory tasks, both to examine factors within these measurement approaches and to examine potential areas of overlap (Sharma et al., 2014). Three factors appeared to be derivable from the self-report questionnaires, which mapped largely onto the familiar “Big Three” dimensions (i.e., Negative Emotionality, Positive Emotionality, Disinhibition-Constraint; Watson & Clark, 1993). In contrast, four factors were extracted from the laboratory tasks, and were termed Inattention (difficulty attending selectively to a stimulus), Inhibition (ability to inhibit one's response to a stimulus), Impulsive Decision-Making (difficulty delaying gratification), and Shifting (difficulty engaging in cognitive flexibility). At the construct level, these two groups of factors did not overlap substantially, but their combined predictive validity for impulsive behaviors appeared to be stronger than the predictive validity for either group alone (Sharma et al., 2014).

Models of impulsivity across the past several decades of research have consistently comprised several characteristics, including the assumption that impulsivity is irrational (Monterosso & Ainslie, 1999). Impulsivity is also typically thought to involve the “approach” component of approach-avoidance or approach-inhibition behavioral systems (e.g., Gray, 1981, 1987; Zuckerman

& Kuhlman, 2000), and some authors distinguish between functional and dysfunctional impulsivity, although this distinction has not been universally accepted (Dickman, 1990). Finally, impulsivity's multidimensional nature has been well-established, although as previously discussed, the exact number and character of these dimensions is not yet determined.

In many ways, impulsivity's long empirical and theoretical history, as well as its relevance to such a broad range of psychopathology, raises more questions than it answers. Specifically, the psychopathological correlates of impulsivity are highly varied in their phenotypic presentation and presumed etiology. Yet the construct's varied contributions to the features of mental disorders and the substantial evidence for impulsivity's heterogeneity increasingly suggest that its multiple dimensions probably relate differentially to different conditions. Thus, examination and clarification of these dimensions should further inform the assessment and understanding of psychopathology.

The Present Review

Most instruments designed to assess impulsivity are based on the previously discussed diverse theoretical models of the construct, thereby leading to difficulties with comparing findings across studies. There is no “gold standard” assessment tool for impulsivity, so researchers often use cobbled-together means of assessment, sometimes drawing subscales from multiple larger assessment instruments, and other times relying on one or more instruments designed explicitly for this construct. This approach has resulted in an often-disjointed literature, and in difficulties with integrating findings into a cohesive working model of impulsivity. In an effort to begin to resolve this confusion, Whiteside and Lynam (2001) developed a new instrument to coalesce existing measures and models of impulsivity into an overarching conceptualization that includes all relevant components of the construct (Whiteside & Lynam, 2001). This measure did not adopt a specific theoretical stance on the nature or causes of impulsivity, but was instead an effort to capture what the authors believed to be diverse etiological “pathways” to impulsivity. This instrument, the “Negative Urgency, (lack of) Premeditation, (lack of) Perseverance, Sensation Seeking, Positive Urgency,” or “UPPS/UPPS-P”² (Lynam, Smith, Cyders, Fischer, & Whiteside, 2007; Whiteside & Lynam, 2001), has become a widely used measure of impulsivity. According to PsycINFO³, 277 studies have cited either the UPPS or UPPS-P as relevant or utilized measures.

The UPPS was derived through factor analysis of 20 scales drawn from nine well-validated self-report measures, including omnibus personality measures as well as measures developed specifically to assess impulsivity, with the goal of distilling these instruments into an “inclusive” model of the impulsivity construct (Whiteside & Lynam, 2001). In particular, the development process of the UPPS was an attempt to address the previously discussed confusion regarding the dimensions of impulsivity. Through an exploratory factor analysis of a large number of extant

² For ease of reference, and because relatively few studies in this review use the UPPS-P, we will consistently use “UPPS” when referring to either this instrument or its newer revision, and in reporting results, will explicitly specify when this includes Positive Urgency.

³ <http://www.apa.org/pubs/databases/PsycINFO/index.aspx>

impulsivity measures, the authors hoped to compensate for the item selection problem that may lead to omission or overrepresentation of dimensions. Item aggregation has long been regarded as an important component of test development (Epstein, 1979); through the use of many reliable impulsivity measures based on a variety of conceptualizations, Whiteside and Lynam (2001) hoped to acquire a clearer understanding of the factor space of this heterogeneous and poorly understood construct.⁴

Indeed, the four-factor model of impulsivity that emerged from this factor analysis has been replicated in several studies and in undergraduate, community, and patient populations (e.g., Magid & Colder, 2007; Miller et al., 2003; Smith et al., 2007; Whiteside, Lynam, Miller, & Reynolds, 2005), and the UPPS has become a reliable measure that appears to exhibit satisfactory construct validity. High scores on the UPPS correlate with a wide range of behavioral manifestations of impulsivity (Lynam & Miller, 2004; Smith et al., 2007), and scores on the UPPS subscales also correlate with other instruments designed to assess impulsivity, including other self-report measures (e.g., BIS/BAS, BIS-11, Disinhibition Inventory, NEO-PI-R; Duckworth & Kern, 2011; Seibert, Miller, Pryor, Reidy, & Zeichner, 2010; Sharma, Kohl, Morgan, & Clark, 2013; Whiteside & Lynam, 2001) as well as some behavioral measures (e.g., delayed ocular response tasks, go/no-go tasks; Gay, Rochat, Billieux, d'Acromont, & Van der Linden, 2008; Roberts, Fillmore, & Milich, 2011). Therefore, the UPPS is increasingly being used to examine impulsivity's relations with other personality traits as well as with a wide range of psychopathological features.

The UPPS and UPPS-P include, respectively, four and five subscales ostensibly reflecting different "pathways" to impulsive behavior (Whiteside & Lynam, 2001). In other words, the UPPS model of impulsivity conceptualizes the construct as a latent variable that encompasses a broad range of behaviors or symptoms. In contrast to instruments that examine *subtypes* of impulsivity, the UPPS subscales are intended to capture separable underlying developmental processes that predispose individuals to different manifestations of impulsive behavior. This measure therefore provides a potentially unique perspective on the development and trajectories of both the personality trait of impulsivity as well as the disorders in which impulsive behavior is implicated. Nevertheless, the assertion that these subscales comprise diverse pathways to a shared impulsivity construct, as opposed to different facets of impulsivity, remains largely untested, and therefore unsupported, by systematic studies. Independent confirmatory factor analyses (CFAs) have verified the original four factors (e.g., Kämpfe & Mitte, 2009), but to these authors' knowledge, there have been no CFAs examining the existence of a higher order latent impulsivity factor underpinning the UPPS subscales. Additionally, the UPPS was developed on a sample of undergraduate students; as a result, the proposed factor structure may be limited to nonclinical samples. It is therefore important to investigate the replicability of these factors in samples marked by higher levels of psychopathology.

The first of these proposed pathways, termed Lack of Premeditation, is defined as the absence of a "tendency to delay action in favor of careful thinking and planning" (e.g., "My thinking is usually careful and purposeful," reversed; Whiteside & Lynam, 2001, p. 677). Urgency, the second proposed pathway, is defined as a "tendency to commit rash or regrettable actions as a result of

negative affect" (e.g., "When I am upset I often act without thinking"; Whiteside & Lynam, 2001, p. 677). The third proposed pathway, Sensation Seeking, is defined as the "tendency to seek excitement and adventure" (e.g., "I'll try anything once"; Whiteside & Lynam, 2001, p. 677). The fourth proposed pathway, Lack of Perseverance, is the absence of an "ability to remain with a task until completion and avoid boredom" (e.g., "I finish what I start," reversed; Whiteside & Lynam, 2001, p. 677). The fifth proposed pathway, added in the revision of the UPPS—the UPPS-P (Lynam et al., 2007)—is Positive Urgency, which assesses "rash action in response to a positive mood" (Cyders et al., 2007, p. 108).

Psychopathological Correlates of the UPPS Model and Meta-Analytic Predictions

Several predictions concerning the associations between the impulsivity factors assessed by the UPPS and various forms of psychopathology have been examined empirically (e.g., Miller et al., 2003; Whiteside & Lynam, 2001). Nevertheless, many sizable theoretical and empirical gaps remain. Specifically, the UPPS model is sufficiently new that it is not yet associated with a summary literature. As a consequence, there is little consensus concerning its correlates, relations to certain types of psychopathology relative to others, or its subscales' differential relations with different impulsive behaviors or disorders.

These are important missing pieces. To lay the groundwork for the hypotheses guiding our meta-analysis, we provide a brief review of the literature regarding the role of impulsivity, and specifically the UPPS, within psychopathology. Our aim in presenting this review is to summarize the literature on the psychopathological correlates of the UPPS and UPPS-P, and in so doing to highlight the often-mixed findings for these instruments. We will also form hypotheses regarding some of the behavioral or cognitive mechanisms that may drive correlations between the UPPS subscales and certain types of psychopathology. In doing so, we make no a priori assumptions regarding whether the UPPS scales reflect differing pathways to impulsivity, as proposed by the authors of this instrument, or different facets of a heterogeneous impulsivity construct. The categories of psychopathology discussed in this review are drawn from our literature search (see the Method section for further detail regarding study selection).

Lack of Premeditation

High levels of Lack of Premeditation may be based on poor cognitive capabilities of reflection and consideration of consequences, including low levels of executive control (Phillippe et al., 2010; Ray, Poythress, Weir, & Rickelm, 2009), thereby leading to decision making with little regard to past outcomes or forethought for possible future outcomes. This dimension may also stem from low self-control (Latzman & Vaidya, 2013), or from a high tolerance for punishment from maladaptive or risky behaviors: The negative consequences of these behaviors may not be sufficient to deter individuals with high scores on this factor.

Consistent with the failure to consider consequences, as described previously, Lack of Premeditation has been shown to

⁴ See Whiteside and Lynam (2001) for detailed methods regarding the construction of the UPPS.

predict increased frequency of alcohol or substance use (Magid & Colder, 2007), as well as the presence of BPD features (Lynam, Miller, Miller, Bornovalova, & Lejuez, 2011). It has displayed small positive correlations with bulimic symptoms, moderate correlations with reactive aggression (Ray et al., 2009), and moderate correlations with suicidality and nonsuicidal self-injury (NSSI; Glenn & Klonsky, 2010; Yen et al., 2009), all of which could be interpreted not only as a failure to consider consequences but also as a high tolerance for negative consequences of impulsive behaviors. Finally, Lack of Premeditation has demonstrated moderate negative correlations with compulsions: In other words, higher premeditation is correlated with higher compulsive behaviors. This association may be attributable to the focus on potential negative consequences that is common among individuals with compulsions (Zermatten & Van der Linden, 2008).

To summarize, we expect that in this meta-analysis, Lack of Premeditation will show moderate positive associations with substance and alcohol use, BPD traits, eating pathology, reactive aggression, suicidality, and, based on the reported findings regarding compulsions, with anxiety or obsessive-compulsive disorders.

Negative Urgency

We posit that high levels of Negative Urgency are related to negative reinforcement, and that this mechanism largely drives the predicted correlations. That is, when individuals engage in behaviors driven by Negative Urgency, they may do so based on a strong and immediate need to avoid undesirable stimuli, such as negative emotions or physical sensations. Behaviors driven by Negative Urgency may also stem from a “depletion of cognitive resources” (Dick et al., 2010, p. 223); that is, experiencing strong negative affect may lessen high-urgency individuals’ abilities to make adaptive choices or to otherwise cope effectively.

Negative Urgency has been linked to every category of psychopathology included in this meta-analysis, probably stemming in part from the heavy saturation of this dimension with negative affect. Negative Urgency moderately to strongly predicts problematic alcohol and substance use (Latzman, Chan, & Shishido, 2013; Magid & Colder, 2007), BPD features (Lynam et al., 2011; Traggesser & Robinson, 2009), suicidality and NSSI (Nock & Prinstein, 2004; Yen et al., 2009), and disordered eating, in particular, bingeing and purging (Claes, Vandereycken, & Vertommen, 2005; Rosval et al., 2006; Stojek, Fischer, Murphy, & MacKillop, 2014). Each of these maladaptive behaviors is often performed in response to stimuli that are perceived to be emotionally unbearable, and these behaviors often result in a short-term relief from such stimuli, supporting the “cognitive depletion” hypothesis described previously. Negative Urgency also consistently demonstrates moderate positive correlations with aggression (Carlson, Pritchard, & Dominelli, 2013; Derefinko, DeWall, Metze, Walsh, & Lynam, 2011), which may be attributable to similar mechanisms, although manifested via externalizing rather than internalizing behaviors. Finally, Negative Urgency shows small to moderate correlations with symptoms of depression (d’Acromont & Van der Linden, 2007; Miller et al., 2003) and anxiety (Cogle, Timpano & Goetz, 2012; Miller et al., 2003), as well as with obsessive thoughts (Gay, Schmidt, & Van der Linden, 2011), probably because of the negative affect and difficulty with affect regulation that are common in symptoms of anxiety and depression.

To summarize, we expect that Negative Urgency will be positively correlated with all types of psychopathology examined in this meta-analysis. We hypothesize that it will correlate most strongly with substance and alcohol use, BPD traits, suicidality and NSSI, and disordered eating.

Sensation Seeking

In contrast to Negative Urgency, Sensation-Seeking appears to be driven largely by positive reinforcement. That is, behaviors that are perpetuated by Sensation-Seeking may introduce a desirable stimulus, often in the form of stimulation or arousal, effectively reinforcing the individual for engaging in such behaviors. Notably, this pattern aligns with the concept of automatic reinforcement (as described by Miltenberger, 2005), because of the reinforcers typically being provided either internally or through natural consequences in the environment. Sensation-seeking behavior may also be driven by a high threshold for fear (Netter, Hennig, & Roed, 1996), low pain sensitivity (Anestis, Bagge, Tull, & Joiner, 2011), and/or an increased dopamine release in response to stressors (Piazza et al., 1993).

Consistent with this conceptualization, Sensation-Seeking correlates robustly with increased frequency of substance and alcohol use (Magid & Colder, 2007). Perhaps related to the lower physiological reactions to stress or pain, Sensation-Seeking also correlates moderately with suicidality (Witte, Gordon, Smith, & Van Orden, 2012) and NSSI (Glenn & Klonsky, 2010). Sensation-Seeking appears to negatively predict obsessive thoughts (Gay et al., 2011) and symptoms of generalized anxiety disorder (GAD; Miller et al., 2003), which may be attributable to the behavioral avoidance that is closely related to anxiety disorders, and the contrasting approach tendencies in high Sensation-Seeking scorers. Sensation-Seeking has demonstrated strong correlations with both primary psychopathy, which is associated with low empathy, low guilt, and lack of deep-seated social emotions, and secondary psychopathy, which is associated with aggression, manipulativeness, and criminal behavior (Poythress & Hall, 2011). Finally, Sensation-Seeking demonstrates small positive correlations with bulimic symptoms (Fischer, Smith, & Cyders, 2008).

To summarize, we expect that Sensation-Seeking will correlate positively with substance and alcohol use, aggression and psychopathy, and suicidality. It is likely to correlate negatively with anxiety symptoms, and may demonstrate a small positive correlation with eating pathology.

Lack of Perseverance

High levels of Lack of Perseverance may reflect cognitive difficulties with maintaining attention over an extended period of time. It may be related to a low sense of responsibility, thereby leading to more dangerous or maladaptive behavioral choices (Magid & Colder, 2007). This dimension may also relate to insufficient reinforcement derived from certain stimuli.

Consistent with its conceptualization involving low responsibility, Lack of Perseverance relates strongly to problematic alcohol or substance use (Dick et al., 2010; Latzman et al., 2013), as well as to BPD features (Lynam et al., 2011). Lack of Perseverance appears to correlate moderately with aggression and secondary psychopathy, perhaps also because of a low sense of responsibility

(Derefinko et al., 2011; Ray et al., 2009), and demonstrates small positive correlations with depression, which may stem from a lack of positive reinforcement from activities (d'Acremont & Van der Linden, 2007; Miller et al., 2003). Finally, Lack of Perseverance, much like Lack of Premeditation, correlates negatively with compulsive behaviors such as ordering and checking (Zermatten & Van der Linden, 2008). Thus, high perseverance relates to high compulsive behaviors; this is probably attributable to the intense rumination and fixation on these behaviors and the obsessive thoughts that accompany them.

To summarize, we hypothesize that Lack of Perseverance will correlate positively with alcohol and substance use and BPD traits, and negatively with symptoms of anxiety and obsessive-compulsive disorders. It may also be associated with aggression and symptoms of depression.

Positive Urgency

Positive Urgency may be driven by mechanisms similar to those underpinning Negative Urgency. Nevertheless, instead of negative reinforcement, Positive Urgency is presumably driven more by positive reinforcement, namely, the introduction of rewarding stimuli in response to a behavior. Therefore, behaviors associated with Positive Urgency are likely to stem from an immediate desire to engage in highly rewarding activities. Because of this tendency, it should be associated with high-risk, high-reward behaviors also seen in high-sensation-seeking individuals.

Compared with other UPPS dimensions, there is less research on Positive Urgency because of its relatively recent inclusion in the UPPS model of impulsive behavior. However, this dimension has been shown to relate both to increased frequency and problematic use of alcohol or substances (Cyders & Smith, 2008; Latzman et al., 2013), perhaps related to a stronger need to respond behaviorally to intense positive affect, with the goal of enhancing this affect in ways that provide immediate gratification (Cyders et al., 2010). Similarly, Positive Urgency relates strongly to BPD traits (Lynam et al., 2011; Tragesser & Robinson, 2009), which may be attributable to the intense affect present in individuals with such traits (Cyders & Smith, 2008; Linehan, 1993) and the difficulty that these individuals may experience in responding to intense affect adaptively. Finally, Positive Urgency has had inconclusive relations with aggression, including both positive and near-zero correlations (Derefinko et al., 2011; Miller, Zeichner, & Wilson, 2012).

Therefore, we expect that Positive Urgency will correlate strongly with alcohol and substance use, as well as with BPD traits. It may correlate to a lesser degree with aggressive behaviors.

Intra-UPPS Comparisons

Few studies examine multiple symptoms, behaviors, or disorders in the context of impulsivity, and consequently there is a dearth of literature approaching the UPPS from a transdiagnostic perspective. We therefore advance no a priori hypotheses regarding which UPPS subscale will display the strongest associations within each category of psychopathology. Nevertheless, these analyses have the potential to provide important information for understanding the differential correlates and meaning of the UPPS subscales. We will conduct and present these analyses, but this component of the meta-analysis will be exploratory in nature.

Unresolved Questions

To recapitulate, this meta-analysis aims to address unresolved questions regarding the assessment of impulsivity from the perspective of the UPPS model. These questions include the mixed findings for a number of disorders, most notably for internalizing conditions such as depression, anxiety, and suicidality and NSSI. The heterogeneity of both impulsivity and psychopathology has most likely led to inconsistencies in past research, which this meta-analysis intends to clarify. To accomplish this, we adopt a targeted approach, examining the subscales and potential mechanisms underlying one widely used broad-band measure of impulsivity.

Method

The UPPS Scale

The UPPS scale is a 45-item self-report instrument that uses a 4-point Likert scale (Whiteside & Lynam, 2001). Each subscale contains 10 to 12 items. A revised version of the scale, the UPPS-P (Lynam et al., 2007), also includes Positive Urgency as distinct from the already-existing (negative) Urgency scale. This scale consists of 14 self-report items, similarly assessed on a 4-point Likert scale.

In the development of the UPPS (Whiteside & Lynam, 2001), Lack of Premeditation (Cronbach's $\alpha = .91$) was the primary impulsivity factor extracted from the scales utilized, and accounted for the most variance in factor analyses. Negative Urgency (Cronbach's $\alpha = .86$) was the second-largest factor, and Sensation Seeking was the third (Cronbach's $\alpha = .90$). Finally, the fourth extracted factor was termed Lack of Perseverance (Cronbach's $\alpha = .82$).

Independently from the original authors of the UPPS, a fifth subscale of Positive Urgency (as distinct from the *Negative Urgency* subscale of the UPPS) was developed (Cyders et al., 2007). Because the Negative Urgency scale refers only to negative affect, the Positive Urgency scale assesses an ostensibly separate, symmetric pathway to impulsive behavior. Therefore, to ensure a more comprehensive assessment of impulsivity, the UPPS was revised to incorporate this subscale, and was retermed the "UPPS-P" (Lynam et al., 2007).⁵

Study Selection

Published studies through October 2014 were gathered by entering the term "UPPS" into Google Scholar in conjunction with "impulsivity" and "disinhibition." All collected studies were separated into categories based on psychopathology, using the constructs identified by authors as well as conventional definitions or equivalences (e.g., negative emotionality representing a similar construct to anxiety; Fowles, 1987) to group studies together.

⁵ A child version of the UPPS, the UPPS-R-C, has also been developed (see Zapolski, Stairs, Settles, Combs, & Smith, 2010). However, only seven studies that utilized the child scale were found through Google Scholar, and because it has not been examined in conjunction with the adult version of the UPPS, subscale equivalence has not yet been established. Therefore, studies using this measure have not been included in the present analyses.

Subsequent searches were conducted using the terms “UPPS” + “impulsivity,” plus each type of psychopathology (e.g., “UPPS” + “impulsivity” + “alcohol”; “UPPS” + “impulsivity” + “depression”). Google Scholar searches for terms appearing anywhere in an article; thus, even studies that did not include “UPPS” in the title or in keywords were identified. In this meta-analysis, we elected to examine indices of psychopathology directly relevant to *Diagnostic and Statistical Manual of Mental Disorders (DSM; American Psychiatric Association, 2000, 2013)* disorders, including behaviors that bear on these disorders. There are scattered studies examining other behaviors (e.g., cigarette smoking, Internet addiction) that may hold implications for psychopathology, but because (a) these are not necessarily linked to *DSM* disorders, and (b) there were too few studies in these categories to allow stable analyses (typically fewer than five), they were excluded.

Participants and Construct Measurement

One hundred fifteen studies were used in analyses, with data collected from 120 samples and a total of 40,432 participants (see online supplemental Appendix). Samples were 61% ($n = 74$) undergraduate students, 17% ($n = 20$) clinical or offender, 13% ($n = 15$) community samples, and 9% ($n = 11$) secondary school students (using the UPPS or UPPS-P, not the UPPS-C). Outcome variables of each study were grouped into broader analytic categories based on their (a) well-established intercorrelations in the clinical literature (e.g., Kessler, Chiu, Demler, Merikangas, & Walters, 2005), and (b) placement within recent and current versions of the *DSM* (5th ed.; *DSM-5; American Psychiatric Association, 2013*). For example, in the *DSM-5*, conditions characterized by abuse of alcohol and other substances are housed within the umbrella category of “Substance Use Disorders,” and bulimia nervosa and binge eating disorder are housed within the umbrella category of “Feeding and Eating Disorders.” Although anxiety and obsessive-compulsive disorders were separated for the first time in *DSM-5*, we combined them into one category for the analyses reported here, (a) given their longstanding historical association and empirical overlap (Abramowitz & Jacoby, 2014), and (b) to maximize statistical power for the analyses.

Seven broad categories of psychopathology were included in the analyses, with data collected using self-report, behavioral, and interview techniques. In decreasing order of average number of studies per UPPS subscale (provided in parentheses), the identified categories and typical assessment techniques in each are as follows.

Alcohol and substance use (average $k = 33.2$) was typically assessed using either self-report questionnaires designed to measure impairment in functioning (e.g., the Rutgers Alcohol Problems Index; White & Labouvie, 1989) or behavioral reports (e.g., “How many drinks do you typically consume in a given week?”). Symptoms of bulimia nervosa and binge eating disorder (average $k = 22.5$) were also typically assessed using self-report questionnaires (e.g., the Eating Disorder Examination-Self Report Questionnaire version; Fairburn & Beglin, 1994) or behavioral reports (e.g., “How many times do you purge in a given week?”). Traits of BPD (average $k = 18$), including emotion dysregulation, were usually assessed through self-report instruments (e.g., the Distress Tolerance Scale; Simons & Gaher, 2005) or structured or semistructured interviews (e.g., the Structured Clinical Interview for

DSM-IV Axis II Personality Disorders; Gibbon & Spitzer, 1997). Depressive symptoms (average $k = 16.25$) were usually assessed by means of self-report measures (e.g., the Beck Depression Inventory; Beck, Steer, & Brown, 1996), whereas NSSI and suicidality (average $k = 14$), which includes both suicidal ideation and suicide attempts, were generally assessed using behavioral frequency items or questionnaires such as the Deliberate Self-Harm Inventory (Gratz, 2001). Aggressive and antisocial behaviors (average $k = 13.75$), including psychopathic personality traits, were assessed using a mix of behavioral reports (e.g., “How many times have you initiated a physical fight?”), self-report questionnaires (e.g., the Psychopathic Personality Inventory-Revised; Lilienfeld & Widows, 2005), or semistructured interviews in conjunction with file information (e.g., the Psychopathy Checklist-Revised; Hare, 1991, 2003). Finally, symptoms of anxiety (average $k = 13.75$), including obsessive-compulsive symptoms, were typically assessed through self-report questionnaires (e.g., the Beck Anxiety Inventory; Beck & Steer, 1990; the Obsessive-Compulsive Inventory; Foa, Kozak, Salkovskis, Coles, & Amir, 1998).

Studies included correlational and between-groups designs; in the latter cases, effect sizes were calculated based on the means and standard deviations provided for each group. For the purpose of increasing power for our analyses, we combined these categories, as well as data across samples, recognizing that this approach may introduce additional heterogeneity (see Approach to Data Analysis and Results Sections for further discussion of heterogeneity effects).

Approach to Data Analysis

Borenstein, Hedges, Higgins, and Rothstein (2009) outlined an approach to meta-analysis in which analyses are based largely on Q statistics. We follow this approach here, relying on Q s as substitutions for the sum of squares calculations used in standard F tests.⁶ All effect sizes were converted to Pearson’s r , as the majority of studies included in this review are correlational.

All effect sizes were transformed to Fisher’s z s for the purpose of analysis, but effect sizes presented were transformed back to Pearson’s r s. Analyses used a random effects model, which (in contrast to a fixed effects model) assumes that the collected studies do not share a common effect size and allows for a greater degree of generalizability to other populations. All effect sizes were weighted to account for the additional error introduced with the random effects approach. Additionally, all effect sizes were based on bivariate associations.

The numbers of studies in the comparison groups in this review were often small. This is a function of the relative newness of this instrument, as well as the exclusion of certain study topics (e.g., cell phone use; Internet use) based on irrelevance to the psychopathologies of interest. As a result, some calculations have less power than would be ideal. In many cases, the subscales of the UPPS that are being compared are nested within studies—that is, one study often includes effect sizes for each of the four to five subscales. This nesting, if accounted for statistically, would reduce power further. Because of this limitation, and because we were interested here in examining each of the UPPS subscales individ-

⁶ I^2 statistic also calculated; please contact first author for detailed analyses.

ually, we conducted the meta-analysis separately for each subscale.

Importantly, the UPPS subscales are not orthogonal (Whiteside & Lynam, 2001). Nevertheless, the present analyses do not examine the independent variance of each of the UPPS subscales, as insufficient data are available in the literature to address this question. Specifically, only a small minority of studies in this meta-analysis used partialing techniques to examine the unique contributions of each UPPS subscale above and beyond the others. As a consequence, we focus on each of the subscales' zero-order relations with psychopathology. As discussed previously, because such an approach has not yet been undertaken in a broad and cross-diagnostic manner, these analyses provide a valuable baseline for future regression analyses.

Given the nature of the questions posed in this review, *t* tests were conducted to determine the degree to which each subscale's effect size for each class of psychopathology was significantly greater than zero. Additionally, although analysis of variance (ANOVA) planned contrasts would typically be a relevant statistical test for the scope of this review, the statistically conservative nature of these tests, combined with the low power and small sample size of many comparison groups, would probably result in a failure to detect many significant differences. Simple one-to-one comparisons were instead conducted, using *Q* tests modeled after ANOVA (Borenstein et al., 2009). To limit the Type I error introduced using this strategy, in each set of analyses, the scale or class of psychopathology with the largest effect size was compared with each of the others. This approach resulted in a maximum of six tests for any subset of the data.

Results

Heterogeneity

Tests of heterogeneity using the *Q* statistic were performed on all subgroups used for analyses (see Table 1). Most groups remained heterogeneous even after parsing out the UPPS subscales; however, most studies did not provide enough additional information (e.g., separate effect sizes across gender) to further explore the source of this heterogeneity.

Effect of Publication Year and Sample Size

Regressions were conducted within each form of psychopathology, with publication year as the independent variable. None of these regressions was significant, with all *ps* > .90.

Funnel plots were created (see Figure 1) to examine asymmetry across sample size for each subscale individually, as well as for all subscales together. No significant asymmetry was detected, suggesting that there was not a substantial "file-drawer effect" that might skew the magnitude of effect sizes reported.

Differences Between Categories of Psychopathology Within UPPS Subscales

Lack of Premeditation. For Lack of Premeditation, the average number of studies in each of the seven categories of psychopathology was 17.29, ranging from 12 to 32. The mean effect size of associations across all categories was .14 (*SE* = .01).

Consistent with prediction, Lack of Premeditation demonstrated effect sizes significantly greater than zero at *p* < .001 for alcohol and substance use and borderline personality traits. Contrary to prediction, the effect size for suicidality was significant at *p* < .001, and the effect size for depression was also significant at *p* < .01. Effect sizes for aggression, anxiety, and disordered eating were non-significant.

Lack of Premeditation demonstrated the strongest association with alcohol and substance use ($r_{\text{mean}} = .28, SE = .03$), and the weakest with anxiety ($r_{\text{mean}} = -.02, SE = .05$; see Table 1 for means and standard errors). The effect size for alcohol and substance use was significantly greater than the effect sizes for depression ($Q[1, 44] = 10.58, p < .01$), suicidality ($Q[1, 43] = 5.41, p < .05$), aggression ($Q[1, 44] = 5.79, p < .05$), anxiety ($Q[1, 42] = 33.43, p < .001$), borderline personality traits ($Q[1, 46] = 6.38, p < .05$), and disordered eating ($Q[1, 50] = 46.15, p < .001$).

Negative Urgency. For Negative Urgency, the average number of studies in each of the seven categories of psychopathology was 24.14, ranging from 14 to 44. The mean effect size of associations across all categories was .34 (*SE* = .01).

Consistent with prediction, Negative Urgency demonstrated effect sizes significantly greater than zero at *p* < .001 for suicidality,

Table 1
Means, Standard Deviations, and Heterogeneity Across Subscales and Psychopathologies

	Alcohol/Substance	Depression	Suicidality/NSSI	Aggression	Anxiety	Borderline	Disordered eating	Total
LPrem	.28 (.03)***	.10 (.04)***	.16 (.04)***	.09 (.07)***	-.02 (.05)***	.19 (.03)**	.02 (.03)**	.14 (.01)***
Neg. Urg.	.29 (.02)***	.45 (.03)***	.25 (.04)***	.31 (.04)***	.40 (.04)***	.58 (.05)***	.31 (.02)***	.34 (.01)***
Sens. Seek.	.19 (.02)***	-.04 (.03)***	.15 (.06)***	.18 (.04)***	-.06 (.04)**	.06 (.05)***	.01 (.02)	.08 (.01)***
LPers	.19 (.02)***	.11 (.06)***	.16 (.05)***	.07 (.06)**	.06 (.04)***	.30 (.04)*	.05 (.03)***	.14 (.01)**
Pos. Urg.	.30 (.02)***	—	—	—	—	—	—	—
Total	.26 (.01)***	.24 (.02)***	.18 (.02)	.22 (.02)	.13 (.02)***	.22 (.02)**	.09 (.01)***	—

Note. Weighted mean effect sizes and standard errors are presented for each cell in the form "Mean (SE)." "Total" cells present weighted mean effect sizes and standard errors for each full row or column. Empty cells represent categories with fewer than five studies. Asterisks indicate significance of *Q* value (i.e., heterogeneity of effect sizes). NSSI = Nonsuicidal self-injury; LPrem = Lack of Premeditation; Neg. Urg. = Negative Urgency; Sens. Seek. = Sensation Seeking; LPers = Lack of Perseverance; Pos. Urg. = Positive Urgency.

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

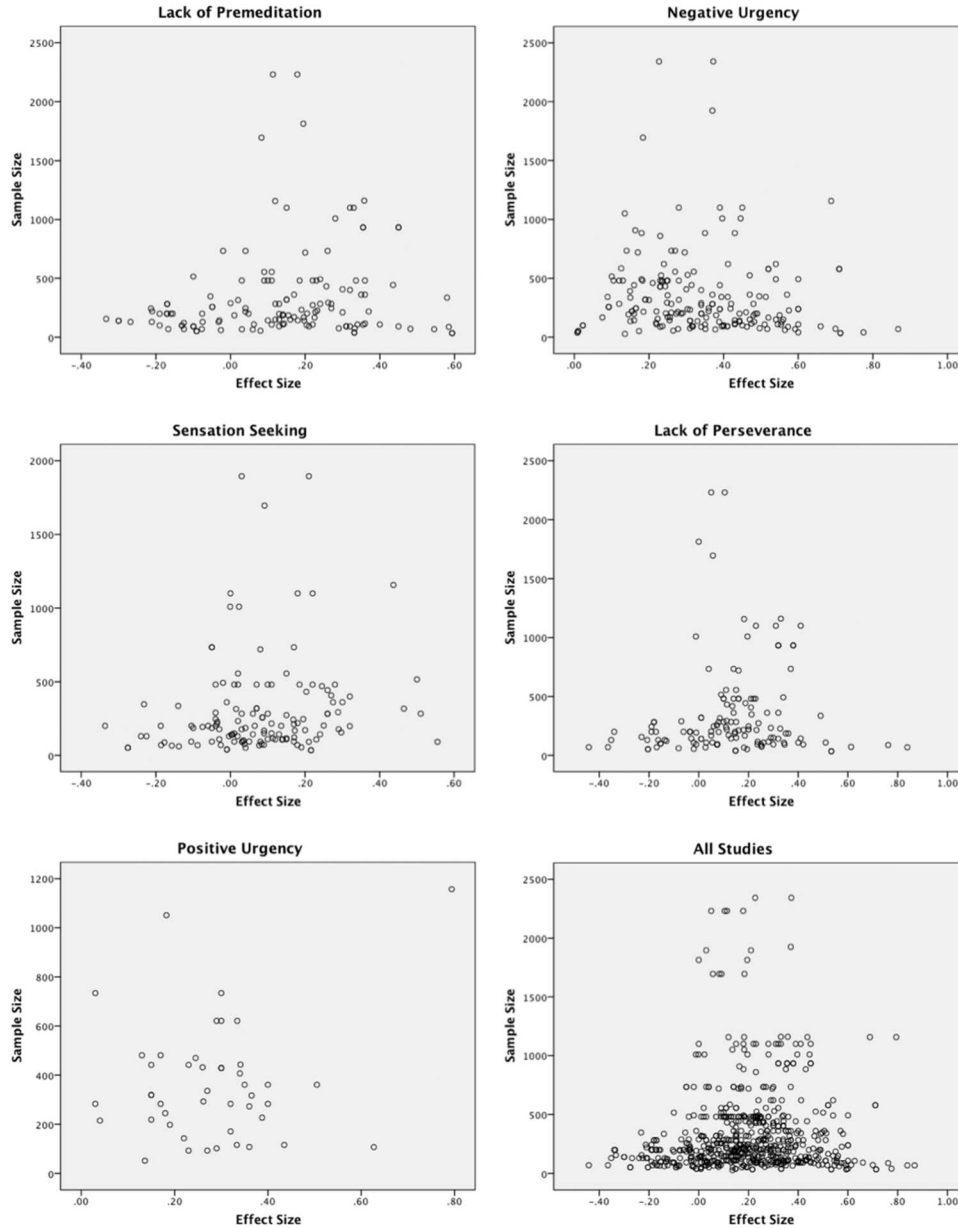


Figure 1. Funnel plots for collected meta-analytic studies, separated by UPPS-P subscale.

aggression, anxiety, borderline personality traits, and disordered eating; contrary to prediction, Negative Urgency also demonstrated significant effect sizes for depression and alcohol and substance use.

Borderline personality traits yielded the largest effect size ($r_{\text{mean}} = .58, SE = .05$), whereas suicidality had the smallest effect size ($r_{\text{mean}} = .25, SE = .04$; see Table 1 for means and standard errors). The effect size for borderline personality traits was significantly greater than the effect sizes for alcohol and substance use ($Q[1, 64] = 28.48, p < .001$), suicidality ($Q[1, 36] = 27.27, p < .001$), aggression ($Q[1, 34] = 17.62, p < .001$), anxiety ($Q[1, 41] = 6.14, p < .05$), and disordered eating ($Q[1, 50] = 21.19, p < .001$).

Negative Urgency displayed the largest effect size for every category of psychopathology in these analyses with the exception of alcohol and substance use, for which Positive Urgency had the largest effect size. One-to-one comparison Q -tests revealed that the effect sizes for Negative and Positive Urgency were not significantly different within the alcohol and substance use category ($Q[1, 65] = .21, p > .50$). However, both Urgency effect sizes in this category were significantly greater than those for Lack of Perseverance and Sensation Seeking (respectively, and compared with Negative Urgency: $Q[1, 74] = 6.71, p < .01$; $Q[1, 77] = 7.22, p < .01$).

Along similar lines, the effect size for Negative Urgency was significantly greater than the effect sizes for all other UPPS sub-

scales⁷ for borderline personality traits ($Q_{NU-LP_{rem}}[1, 36] = 45.08$, $p < .001$; $Q_{NU-LP_{ers}}[1, 36] = 28.97$, $p < .001$; $Q_{NU-SS}[1, 38] = 69.81$, $p < .001$), disordered eating ($Q_{NU-LP_{rem}}[1, 48] = 55.02$, $p < .001$; $Q_{NU-LP_{ers}}[1, 48] = 49.01$, $p < .001$; $Q_{NU-SS}[1, 48] = 108.62$, $p < .001$), aggression and psychopathy ($Q_{NU-LP_{rem}}[1, 26] = 5.50$, $p < .05$; $Q_{NU-LP_{ers}}[1, 27] = 13.20$, $p < .001$; $Q_{NU-SS}[1, 24] = 5.12$, $p < .05$), depression ($Q_{NU-LP_{rem}}[1, 34] = 38.76$, $p < .001$; $Q_{NU-LP_{ers}}[1, 35] = 23.81$, $p < .001$; $Q_{NU-SS}[1, 34] = 100.68$, $p < .001$), and anxiety ($Q_{NU-LP_{rem}}[1, 31] = 44.06$, $p < .001$; $Q_{NU-LP_{ers}}[1, 31] = 36.74$, $p < .001$; $Q_{NU-SS}[1, 29] = 62.54$, $p < .001$).

The notable exception to this pattern was in the category of suicidality and NSSI. In this category, Negative Urgency again displayed the largest effect size, but this effect size was only significantly greater than that for Lack of Perseverance, and by a smaller margin than most of the previously reported differences ($Q[1, 27] = 5.03$, $p < .05$).⁸

Sensation Seeking. For Sensation Seeking, the average number of studies in each of the seven categories of psychopathology was 17.57, ranging from 10 to 35. The mean effect size of associations across all categories was .08 ($SE = .01$).

Consistent with prediction, Sensation Seeking demonstrated effect sizes significantly greater than zero at $p < .001$ for alcohol and substance use and aggression. Contrary to prediction, the effect size for suicidality was also significantly greater than zero at $p < .01$. The effect sizes for depression, anxiety, borderline personality traits, and disordered eating were nonsignificant.

Sensation Seeking demonstrated the strongest association with alcohol and substance use ($r_{mean} = .19$, $SE = .02$). Disordered eating demonstrated the weakest effect size ($r_{mean} = .01$, $SE = .02$; see Table 1 for means and standard errors). The effect size for alcohol and substance use was significantly greater than the effect sizes for depression ($Q[1, 47] = 24.27$, $p < .001$), anxiety ($Q[1, 43] = 26.60$, $p < .001$), borderline personality traits ($Q[1, 51] = 8.70$, $p < .01$), and disordered eating ($Q[1, 53] = 40.97$, $p < .001$).

Lack of Perseverance. For Lack of Perseverance, the average number of studies in each of the seven categories of psychopathology was 17.57, ranging from 12 to 32. The mean effect size of associations across all categories was .14 ($SE = .01$).

Consistent with prediction, Lack of Perseverance demonstrated effect sizes significantly greater than zero at $p < .001$ for alcohol and substance use and borderline personality traits, and the effect size for depression was significant at $p < .05$. Contrary to prediction, the effect size for suicidality was significant at $p < .001$, the effect size for disordered eating was significant at $p < .05$, and the effect size for anxiety trended toward significance ($p < .06$). The effect size for aggression was nonsignificant.

Lack of Perseverance demonstrated the strongest association with borderline personality traits ($r_{mean} = .29$, $SE = .04$). Disordered eating demonstrated the smallest effect size ($r_{mean} = .05$, $SE = .03$; see Table 1 for all means and standard errors). The effect size for borderline personality traits was significantly greater than the effect sizes for depression ($Q[1, 29] = 4.12$, $p < .05$), suicidality ($Q[1, 27] = 6.68$, $p < .01$), aggression ($Q[1, 29] = 8.08$, $p < .01$), anxiety ($Q[1, 26] = 15.40$, $p < .001$), and disordered eating ($Q[1, 34] = 26.69$, $p < .001$).

Positive Urgency. Within the Positive Urgency subscale, alcohol and substance use was the only form of psychopathology for which there were more than 10 studies. Therefore, no comparison

analyses were conducted within this subscale. Consistent with prediction, alcohol and substance use demonstrated an effect size significantly greater than zero at $p < .001$.

Discussion

Overall, the results of these analyses highlight numerous informative trends that bear implications for the UPPS model of impulsivity. Many predictions were corroborated, supporting some of the hypothesized mechanisms and proposed pathways to impulsive behavior. Nevertheless, some initial predictions were disconfirmed, suggesting that the roles of the UPPS subscales in psychopathology may require reconsideration in certain cases, and that the distinctions among certain subscales may not be as clear-cut as the UPPS instrument implies.

Negative and Positive Urgency

We advanced no a priori hypotheses regarding which UPPS subscale would most strongly associate with each category of psychopathology, or which subscale would be the most dominant across categories, if any. Nevertheless, results were surprisingly consistent in indicating that in every set of analyses, either Negative or Positive Urgency possessed the largest effect size. The close similarity in the correlational patterns of these subscales raises questions regarding their distinctiveness. These two dimensions may be separate but closely related “subprocesses” of a broader dimension implicating strong emotion, regardless of valence, and impulsive action in response to that emotion.

Further, the emergence of the Urgency subscales as demonstrating the largest effect sizes across psychopathological categories may be unexpected, given that Lack of Premeditation accounted for the greatest amount of variance in the development of the original scale. Nevertheless, Negative Urgency’s predominance in the findings of this meta-analysis is consistent with those of past meta-analyses (e.g., Fischer, Smith, & Cyders, 2008), as well as being consistent with our hypotheses: We predicted a greater number of significant effect sizes for Negative Urgency than for any other UPPS subscale. This finding provides further evidence that the primary component of many impulsivity-based psychopathologies may be a difficulty in regulating one’s response to intense emotion, rather than a failure to adequately plan one’s actions and consider consequences and past feedback. In their description of the development of the UPPS scale, Whiteside and Lynam (2001) indicated that the measure’s subdimensions “are not considered variations of impulsivity, but rather discrete psychological processes that lead to impulsive-like behaviors . . . each of these factors represent a discrete facet of personality which have been erroneously consolidated under the single term impulsivity” (p. 685). It is important to keep this point in mind when interpreting the present findings. Because each factor ostensibly represents a separate pathway to impulsive behavior, it is misleading to assert that Negative Urgency, rather than Lack of Premeditation—or any other UPPS subscale—explains the bulk of *impulsivity* as a reified construct. Rather, in the cases examined here, Negative Urgency

⁷ Save for Positive Urgency; see Positive Urgency section of the Results.

⁸ For detailed analyses by psychopathology rather than by UPPS subscale, contact the first author.

appears to be the dimension that is most strongly implicated in the development of impulsive behavior and in accounting statistically for a broad range of psychopathological symptoms. Thus, focusing on Negative Urgency may provide the most information regarding the specific etiology of impulsivity within each class of psychopathology.

Impulsivity and Emotion

Notably, Negative Urgency and Positive Urgency are the only subscales of the UPPS to explicitly reference an emotional state. There is some disagreement concerning whether the broad trait of impulsivity should include affect or should remain “independent of emotional factors” (Whiteside & Lynam, 2001, p. 685). For example, a recent study (Smith, Guller, & Zapolski, 2013) examined Urgency’s predictive utility for impulsive behavior and depression in elementary schoolchildren, and their findings offered support for a model in which Urgency is predictive of “a tendency to respond reflexively to emotion, whether with rash action or ill-advised inaction” (p. 271).

In most models of personality, impulsivity is emotionally neutral. It is often separated from affectively driven factors; for example, in Watson and Clark’s (1993) three-factor model of negative temperament, positive temperament, and disinhibition, negative temperament and positive temperament represent the emotional components. Similarly, in the FFM of personality, impulsivity is typically associated with low conscientiousness and low agreeableness; in this model, neuroticism and extraversion tend to be thought of as the most emotionally relevant traits (e.g., Goldberg, 1992). Nevertheless, the strong associations between these factors and the wide range of psychopathology examined here suggest either that affect is an important contributor to many impulsive behaviors, or that a deficit in emotion regulation skills drives many manifestations of impulsivity. If the former, studies controlling for negative or positive affectivity (e.g., using proxies such as depression and anxiety) should find that Negative and/or Positive Urgency become nonsignificant predictors. If the latter, the two types of Urgency—assuming that they assess separable processes—should remain significant predictors even after controlling for emotion regulation skills.

A number of studies have, in fact, controlled for negative affect in the relations between Negative Urgency and psychopathology, and in the majority of cases, Negative Urgency remains a significant correlate (e.g., Anestis, Smith, Fink, & Joiner, 2009; Cogle et al., 2012). Even controlling for both negative affect and distress tolerance does not eliminate correlations between Negative Urgency and psychopathology (e.g., Kaiser, Milich, Lynam, & Charnigo, 2012; Smith et al., 2013). Therefore, Negative Urgency may contribute additional variance to impulsive behavior that is not accounted for by negative affect or distress tolerance alone. Further, based on the parallel conceptualizations of Negative Urgency and Positive Urgency, it is likely that Positive Urgency is also not fully subsumed by high affect or low distress tolerance. Additional research is required to ascertain the nature of these contributions, but given the prevalence and strong associations between Urgency and psychopathology in the present review, it will be important to understand the mechanisms underlying both Urgency dimensions (see Cyders et al., 2013, for a preliminary examination of neural processes underlying Negative Urgency).

Negative Urgency and the Other UPPS Subscales

Also notable are the patterns of effect sizes for depression, anxiety and obsessive-compulsive symptoms, and disordered eating. For each of these categories, not only did Negative Urgency demonstrate the highest effect size, but none of the other UPPS subscales demonstrated an absolute effect size larger than .08. In other words, the average correlations for Lack of Premeditation, Lack of Perseverance, and Sensation Seeking in these three categories were essentially zero. Given the differences in symptoms and correlates among eating disorders, mood disorders, and anxiety disorders, this finding may provide further support for Negative Urgency’s multiple contributions toward impulsive behavior. More specifically, on the one hand, Negative Urgency appears to be driven by a negative reinforcement contingency, as discussed in our hypotheses. For example, bulimic urges are often acted on in a state of intense negative affect: Both bingeing and purging function to relieve negative feelings. Anxiety may be somewhat similar in that avoidance or escape is often used to remove oneself from stressful situations. In contrast, negative affect is a core component of clinical depression (Clark & Watson, 1991). Thus, in the case of mood disorders, Negative Urgency may be contributing a largely affective or ruminative component to the perpetuation of depressive symptoms.

The patterns of effect sizes for BPD traits or emotion dysregulation and suicidality or NSSI warrant comparison. From a clinical standpoint, NSSI and BPD were once regarded as almost entirely overlapping: Virtually all self-injurers were considered to be necessarily on the borderline spectrum, and virtually anyone who was on the borderline spectrum was assumed to self-injure (Klonsky, 2007). This synonymy is no longer the case, and although the findings here are not clear-cut, they suggest that different mechanisms may motivate the impulsivity component to each set of behaviors. Specifically, Negative Urgency demonstrated a significantly greater effect size for BPD and emotion dysregulation than did any other UPPS subscale, whereas Negative Urgency did not significantly differ from Lack of Premeditation and Sensation Seeking for suicidality and NSSI. This finding indicates that the pathways to impulsive behavior within the suicidality or NSSI realm may be much more varied than those related to BPD traits. This is not to say that the nature of impulsivity in BPD traits or behaviors is uncomplicated or straightforward, but that the contributions of impulsivity to those behaviors may be more circumscribed than previously thought.

Lack of Premeditation, Lack of Perseverance, and ADHD

Lack of Premeditation and Lack of Perseverance also demonstrated similar patterns of correlation across psychopathological domains. This finding is not wholly unsurprising given that these have been the two UPPS pathways most consistently correlated with behavioral tasks (as opposed to self-report questionnaires) assessing impulsivity (e.g., Gay et al., 2008, 2010). Indeed, the most significant potential exception to the apparent crosscutting pattern of Negative Urgency and impulsive behaviors is ADHD. Only three studies examining ADHD in the context of the UPPS were retrieved for the present review (Miller et al., 2003, 2010; Mitchell, Robertson, Anastopoulos, Nelson-Gray, & Kollins,

2012). Nevertheless, the trends that emerged from these few studies are telling. Across all three, the subscale with the highest association was Lack of Perseverance ($r_{\text{mean}} = .51$), followed by Negative Urgency ($r_{\text{mean}} = .44$) and Lack of Premeditation ($r_{\text{mean}} = .40$). Sensation Seeking demonstrated a near-zero negative association with ADHD ($r_{\text{mean}} = -.02$). Functionally, the deficits often seen in ADHD seem more analogous to the constructs assessed through behavioral measures than to those assessed by self-report instruments. Therefore, certain components of ADHD may give rise to these elevated associations with Lack of Perseverance and Lack of Premeditation, both of which have demonstrated the most consistent correlations with behavioral tasks (e.g., Burnett Heyes et al., 2012; Phillippe et al., 2010). Further investigation of other correlates of ADHD and the two “Lack” subscales is certainly warranted.

Impulse Control Disorders

A discussion of impulsivity would be incomplete without addressing the major impulse control disorders in the *DSM-5* (American Psychiatric Association, 2013): pathological gambling (listed under substance-related and addictive disorders); trichotillomania (now listed under obsessive-compulsive and related disorders); and kleptomania, intermittent explosive disorder, and pyromania (all listed under disruptive, impulse-control, and conduct disorders). These disorders are relatively common, but they are the subjects of little research (e.g., Dell’Osso, Altamura, Allen, Marazziti, & Hollander, 2006). As a consequence, few studies have examined impulse control disorders in relation to the UPPS. In fact, of the five, only pathological gambling has been studied at all in published investigations, and in too few studies to be included in the present meta-analysis. In separate studies, Lack of Premeditation, Negative Urgency, Positive Urgency, and Sensation Seeking have all significantly predicted or correlated with problematic gambling (Cyders et al., 2007, 2010; Fischer & Smith, 2008; Whiteside et al., 2005). Additionally, one meta-analysis combined measures that approximated the four original UPPS scales, and found that Negative Urgency and Lack of Premeditation exhibited the strongest associations with problematic gambling (MacLaren, Fugelsang, Harrigan, & Dixon, 2011). Nevertheless, only one study included in this meta-analysis used the UPPS, with all other studies using instruments based on other personality models. It is therefore difficult to draw conclusions about the relations between pathological gambling and the UPPS subscales from this meta-analysis. Ironically, the one class of *DSM-5* conditions for which the correlates of the UPPS subscales are least understood is therefore impulse control disorders.

Limitations and Future Directions

The primary limiting factor in this meta-analysis was the relatively small number of studies per category, and especially the small number of studies that used the Positive Urgency subscale. Many studies that cite the UPPS model do not use the instrument itself, relying instead on proxies such as facets of the NEO-PI-R. We limited our analyses to the UPPS instruments and did not examine the correlates of a plethora of other measures of impulsivity. As a consequence, our findings are not comprehensive but are more readily interpretable than if multiple measures of impulsivity had been examined.

At the same time, the UPPS is a relatively novel measure. This is especially true of the Positive Urgency subscale, so more research will be needed to clarify its implications for psychopathology. More broadly, a greater number of studies would allow for further parsing of the heterogeneity within each psychopathology \times subscale cell (e.g., Alcohol and Substance Use \times Lack of Premeditation). Most of these cells yielded significant heterogeneity within effect sizes, and discerning the source(s) of this heterogeneity is necessary for an accurate understanding of the UPPS subscales’ relation to psychopathology.

A further limitation was the heterogeneity of psychopathology within each category. For example, alcohol and substance use were combined for the purpose of obtaining higher statistical power. Nevertheless, different impulsivity mechanisms may be implicated in alcohol use, which is legal, as opposed to illicit substance use, which comes with additional risks, such as the threat of arrest and incarceration. The same holds for aggression and psychopathy: Psychopathy appears to be heterogeneous and overlaps only partially with aggression. With the accumulation of further data, these analyses should be reconducted with a closer examination of the heterogeneity within psychopathology, as well as the heterogeneity within the UPPS.

Additional avenues for further investigation include in-depth demographic analyses. Demographic variables such as sex or racial differences were not examined here because of low power; few studies reported differential effect sizes for each demographic group. A meta-analysis of sex differences, using a non-UPPS impulsivity model (Cross, Copping, & Campbell, 2011), found that men were significantly higher on sensation seeking, whereas women were significantly more sensitive to punishment. No other facets of this model were significantly different across sexes. To the authors’ knowledge, no studies have examined differences across other demographic categories with regard to the UPPS. Hence, further investigation of demographic differences across impulsivity measures is required.

Finally, as noted earlier, few studies examined the unique variance contributed to predictand variables by each UPPS subscale. The subscales are not orthogonal, and moderate to high correlations are especially evident between each of the two Urgency subscales and each of the two “Lack” subscales. Therefore, future analyses of the UPPS should use partial correlation or multiple regression approaches to examine the contributions of each factor above and beyond the others, so that shared variance may be parsed out and a clearer understanding of the UPPS model may be gained. At the same time, partialing analyses come with interpretative challenges of their own, especially because partialled variables often differ markedly from the original, unpartialled variables in their content and correlates (Lynam, Hoyle, & Newman, 2006).

Conclusion

The early literature on the UPPS, including Whiteside and Lynam’s (2001) development of the instrument, suggested that Lack of Premeditation would be the aspect of impulsivity most strongly implicated across types of psychopathology. Unexpectedly, this meta-analysis revealed that Negative and Positive Urgency demonstrated the strongest associations across every category of psychopathology assessed, perhaps owing to the extensive

affective saturation of these factors in comparison with the other three. These results suggest that urgency may be the most relevant, or at least most frequently accessed or utilized, dimension of impulsive behavior. What remains unclear, though, is the nature of urgency's unique contribution to psychopathology above and beyond both negative affect and distress tolerance. Future studies should continue to examine Negative and Positive Urgency in the context of a wide range of covariates and impulsive behaviors, with the aim of teasing apart the contributions of these dimensions to impulsive behavior.

Additionally, as with the two Urgency subscales, Lack of Premeditation and Lack of Perseverance demonstrated highly similar correlational patterns, raising the question of whether the construct(s) assessed by these subscales would be better characterized by one scale. The separation of Lack of Premeditation and Lack of Perseverance, as well as the separation of Negative and Positive Urgency, could lead researchers to inadvertently overlook potential communalities, and thereby forfeit potentially important information regarding the shared etiology of these facets of, or ostensible pathways to, impulsivity. Nevertheless, further work on the potential differential personality and psychopathological correlates of these two UPPS dimensions will be needed before they are combined.

The present findings suggest that the UPPS model may not capture five wholly separable processes, as the five-pathway model suggests. The substantial similarities between Negative and Positive Urgency, as well as between Lack of Premeditation and Lack of Perseverance, warrant further investigation to determine whether these dimensions might be better assessed using broader combined scales. To this end, the inclusion of different modalities of assessment, including self-report, cognitive, and neuroimaging measures, should further illuminate the contributions of the UPPS subscales to impulsivity and provide greater information regarding the mechanisms underpinning impulsivity's role within psychopathology.

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