



## Externalizing behavior, the UPPS-P Impulsive Behavior scale and Reward and Punishment Sensitivity

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### ABSTRACT

The UPPS-P Impulsive Behavior scale is a promising measure of impulsivity facets involved in the etiology of Externalizing behaviors (e.g., substance abuse, antisocial behavior, and aggression). The purpose of this study was to determine whether measures of motivational systems, specifically Reward and Punishment Sensitivity, accounted for variance in Externalizing behaviors beyond the UPPS-P scales. Undergraduates ( $N = 282$ ; 50% men) completed online self-reports of alcohol and drug use, antisocial behavior, and aggression, as well as the UPPS-P and measures of Reward and Punishment Sensitivity. Principal components analysis was used to create summary Externalizing scores related to Disinhibition and Aggression. Lack of Premeditation, low Perseverance and Sensation Seeking had significant partial relationships with Disinhibition, but Reward Sensitivity accounted for additional variance. Both Reward Sensitivity and (Low) Punishment Sensitivity were related to Aggression, beyond variance explained by UPPS-P Negative Urgency and (lack of) Perseverance. Impulsivity facets appear to have differential relationships with measures of Externalizing and, although the UPPS-P accounts for a significant portion of individual differences, it does not fully account for variance associated with Reward and Punishment Sensitivity.

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### 1. Introduction

Externalizing behaviors, such as delinquency, aggression and substance use, are related to impulsive traits (e.g., Krueger, Markon, Patrick, Benning, & Kramer, 2007). However, impulsivity has been conceptualized in many ways and appears to be heterogeneous (Miller, Flory, Lynam, & Leukefeld, 2003). Whiteside and Lynam (2001) developed the UPPS Impulsive Behavior scale to identify and assess dissociable impulsive traits either not adequately captured with, or delimited by, existing scales. A multifaceted, comprehensive measure of impulsivity should improve our understanding of which aspects are most relevant in the etiology of Externalizing behavior (Krueger et al., 2007). The UPPS was a major step in this direction as it summarized traits captured by a set of well-established measures while increasing the possibility for discriminant validity by minimizing correlation amongst its factor analytically-derived scales.

Several theories of antisocial personality, however, posit etiological roles for motivational systems derived from the Reinforce-

ment Sensitivity Theory (RST; Gray & McNaughton, 2000; see Fowles, 1988; Lykken, 1995). In the RST, the Behavioral Activation System (BAS) is thought to be sensitive to cues of reward or negative reinforcement. When activated, individuals either engage in approach related behavior towards the likely reward or actively avoid a potential punisher. The Behavioral Inhibition System (BIS) was traditionally viewed as being sensitive to classically conditioned cues of punishment or frustrative non-reward, but is now viewed as playing an inhibitory role when conflicts arise between BAS activation and activation of a third system, called the Fight-Flight-Freezing System (FFFS), which is sensitive to aversive stimuli and cues thereof. Individual differences exist in typical tonic levels of these systems. Traditional theoretical adaptations of the RST used to explain Externalizing behavior have focused on the BAS's sensitivity to reward and the BIS's sensitivity to classically conditioned cues of punishment. In the contemporary view, punishment sensitivity may reflect combined functioning of the FFFS and the BIS (Corr, 2004). Factor analyses of impulsivity scales including measures of these systems identify dissociable dimensions related to Reward Sensitivity, Punishment Insensitivity, and a kind of Rash Impulsivity not covered by the RST, related to acting without considering the consequences (e.g., Caseras, Avila, & Torrubia, 2003; Franken & Muris, 2006). The scales that went into the development of the UPPS, however, arguably underrepresented

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Punishment and Reward Sensitivity. It is unclear if putative measures of Reward and Punishment Sensitivity account for variance in Externalizing behaviors not captured by the UPPS.

In developing the UPPS, Whiteside and Lynam (2001) looked at impulsivity in terms of the Five Factor Model and major measures of impulsivity. They used exploratory factor analysis, which uncovered four factors. First, Premeditation is the tendency to think ahead and plan carefully. Second, Urgency, now called Negative Urgency, reflects a tendency to commit rash actions when experiencing negative affect. Third, Sensation Seeking is a tendency to seek out stimulation or excitement. Fourth, Perseverance is the ability to attend to a task without getting bored. Cyders et al. (2007) subsequently added a facet, Positive Urgency, indexing a tendency to act rashly when experiencing positive affect.

Lack of Premeditation and high Sensation Seeking have been related to alcohol use and abuse in young adults (Lynam & Miller, 2004; Magid & Colder, 2007). Lack of Premeditation, Negative Urgency and Sensation Seeking were related to drug use, and lack of Premeditation was related to marijuana abuse in adults (Lynam & Miller, 2004). Although all facets may be zero-order correlates of substance use in college students, Negative and Positive Urgency predict increases in drinking (Settles, Cyders, & Smith, 2010) and drug use across a school year (Zapolski, Cyders, & Smith, 2009). Aggression has been related positively to Negative Urgency and antisocial behavior is linked to Sensation Seeking and a lack of Premeditation (Lynam & Miller, 2004; Miller et al., 2003). All of the original UPPS scales distinguished antisocial alcohol abusers from non-antisocial alcohol abusers (Whiteside & Lynam, 2003).

High Reward Sensitivity has been related to substance use and disorder, aggression and antisocial behavior (Bjørnebekk, 2007; Franken, Muris, & Georgieva, 2006; Hasking, Scheier, & Ben Addallah, 2011). Although, not universally supported, some studies reporting Reward Sensitivity correlates of Externalizing also report associations with low Punishment Sensitivity (e.g., Franken & Muris, 2006; Taylor, Reeves, James, & Bobadilla, 2006; Voigt et al., 2009). Some studies, however, suggest that Punishment Sensitivity may not be uniquely associated with Externalizing once statistically controlling for Reward Sensitivity (e.g., Hundt, Kimbrel, Mitchell, & Nelson-Gray, 2008).

In the present study, we administered the revised UPPS, the UPPS-P, measures of Reward and Punishment Sensitivity, and self-report of substance use, aggression, and antisocial behavior to a sample of undergraduates. We predicted significant zero-order correlations between an Externalizing dimension and all five UPPS-P scales as well as Reward and Punishment Sensitivity. Given consistent past partial associations of low Premeditation and high Sensation Seeking with a multitude of Externalizing behaviors, we predict that these scales will have significant unique associations with Externalizing. Given the importance of Reward Sensitivity to theories of Externalizing and Reward Sensitivity emerging as a separate trait from facets like those in UPPS-P, we predict that Reward Sensitivity will be related to variance in Externalizing not accounted for by the UPPS-P.

## 2. Method

### 2.1. Participants and procedure

Two hundred eighty-two undergraduate students (50% male) participated in this study. They were between the ages of 19 and 30 ( $M = 20.79$  years,  $SD = 2.11$ ). Students were required to speak English as their primary language for at least 10 years. The majority self-identified as being of European (43.3%), or East Asian descent (40.1%). Students at a western Canadian university were recruited through a departmental website and participated for

extra credit in a psychology class. Procedures were approved by an institutional research ethics board. All participants provided informed consent and completed self-reports online using the website <http://www.SurveyMonkey.com>.

### 2.2. Measures

#### 2.2.1. UPPS-P Impulsive Behavior scale

The UPPS-P included the 45-items of Whiteside and Lynam (2001) combined with the 14-item Positive Urgency scale of Cyders et al. (2007). The items were randomly ordered with the following Cronbach's Alphas: Premeditation (.88), Negative Urgency (.88), Sensation Seeking (.89), Perseverance (.85), and Positive Urgency (.93). In order to make scores sensible given the scale names we scored the scales so that high Negative Urgency, Sensation Seeking, and Positive Urgency indicated high impulsivity, whereas high Premeditation and Perseverance indicated low impulsivity.

#### 2.2.2. Behavioral Inhibition System and Behavioral Activation System scales

The Behavioral Inhibition System and Behavioral Activation System Scales (BIS/BAS; Carver & White, 1994) are comprised of 20-items. The BIS scale ( $\alpha = .80$ ) is unidimensional. The BAS scale, however, consists of three subscales: Drive ( $\alpha = .81$ ), Fun Seeking ( $\alpha = .80$ ) and Reward Responsiveness ( $\alpha = .82$ ). Scales were scored so that high scores indicate high Punishment or high Reward Sensitivity.

#### 2.2.3. Sensitivity to Punishment and Sensitivity to Reward Questionnaire

The Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ; Torrubia, Ávila, Moltó, & Caseras, 2001) is a 48-item measure. The Sensitivity to Punishment (SP, 24-items) and Sensitivity to Reward (SR, 24-items) scales were internally consistent ( $\alpha$ s = .85 and .80, respectively).

#### 2.2.4. Aggression Questionnaire

The 9-item Physical Aggression ( $\alpha = .86$ ) scale and 5-item Verbal Aggression ( $\alpha = .74$ ) scale from the Aggression Questionnaire (Buss & Perry, 1992) were used to measure overt aggressive behaviors.

#### 2.2.5. Self Reported Delinquency scale

The Self Reported Delinquency Scale (SDS; Elliott & Ageton, 1980) is a 47-item measure that taps antisocial behavior. The last 7 drug use items were excluded as this was measured elsewhere. Participants were required to indicate the frequency they engaged in each behavior in the past 5 years in an open-field format. Scores were the sum of the 40-items.

#### 2.2.6. Substance use

Questions recommended by the US National Institute on Alcohol Abuse and Alcoholism (National Institute on Alcohol Abuse, 2003) were used to assess typical quantity of alcohol consumed per occasion and typical frequency of alcohol consumption in the past year. A quantity  $\times$  frequency estimate of past-year use was created by multiplying quantity and frequency. An 11-item drug use frequency scale adapted from the Adolescent Drug Involvement Scale (ADIS; Moberg & Hahn, 1991), which will be referred to as the Drug Use Frequency (DUF) measure, was included. The question inquired about the following drugs: marijuana or hashish; LSD, psilocybin, peyote, other hallucinogens (acid); amphetamines (including meth); cocaine; barbiturates; PCP; heroin; other opiates; valium and other tranquilizers; ecstasy and inhalants (glue, gasoline, spray paint, etc.).

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