



## Emotion regulation and impulsivity in young adults

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### ABSTRACT

Past research has linked both emotion regulation and impulsivity with the development and maintenance of addictions. However, no research has investigated the relationship between emotion regulation and impulsivity within young adults. In the present study, we analyzed 194 young adults (27.8% female;  $21.3 \pm 3.32$  years old; 91.8% single; 85.1% Caucasian), grouping them as low, average, or high emotionally dysregulated, and compared self-reported impulsivity, impulsive behaviors (such as alcohol and substance use and gambling) and cognitive impulsivity. We hypothesized that those with high levels of emotion dysregulation would score higher on self-reported and cognitive impulsivity, and report more impulsive behaviors. Analysis indicated that compared to low, the high emotion dysregulation group scored significantly higher on two self-report measures of impulsivity, harm avoidance, and cognitive reasoning. No significant differences were found between groups in impulsive behaviors and cognitive impulsivity. Overall, this study highlights the relationship between emotion dysregulation and impulsivity, suggesting that emotion regulation may be an important factor to consider when assessing individuals at a higher risk for developing an addiction.

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### 1. Introduction

Emotion regulation can be described as the mechanism through which individuals modify (either intentionally or unintentionally) their emotions to achieve a desired outcome (Aldao et al., 2010). Past studies have found that maladaptive emotion regulation strategies play a role in the development and maintenance of psychopathology (Gross and Muñoz, 1995; Moore et al., 2008), possibly through conflicting with self-regulation goals during periods of emotional distress. This conflict may result in shifting attention away from the longer term goal of self-regulation, such as becoming healthier, and shifting attention toward decreasing emotional distress through seeking out immediate pleasure and relief, such as smoking a cigarette or acting impulsively (Tice et al., 2001). Impulsivity, a multidimensional concept, has been defined as engaging in behaviors without forethought and prematurely responding to stimuli that often produce adverse consequences (Moeller et al., 2007). Both emotion dysregulation and heightened impulsivity have independently been considered risk factors for smoking (Granö et al., 2004; Morrell et al., 2010; Bickel et al., 1999; Gerhrick et al., 2007), drug and alcohol use disorders (Fox et al.,

2007, 2008; Nigg et al., 2005; Quirk, 2001; Tarter et al., 2003; Verdejo-García et al., 2008) and pathological gambling (Hopley and Nicki, 2010; Matthews et al., 2009; Morasco et al., 2007; Shead and Hodgins, 2009; Slutske et al., 2005; Odlaug et al., in press), suggesting that these constructs could predispose individuals to developing and/or maintaining impulsive behaviors and related psychopathology.

Numerous studies have linked emotional states with impulsivity and addictive behaviors. Such studies have found that smoking and unhealthy eating increase during stressful times (Abrantes et al., 2008; Shi et al., in press; Greeno and Wing, 1994; Magid et al., 2009); alcohol is often used to regulate positive and negative moods (Cooper et al., 1995), and that anxiety sensitivity and an inability to tolerate discomfort both significantly predict the development of alcohol or drug problems (Howell et al., 2011; Galen et al., 2001; Stewart et al., 2001; Cheethman et al., 2010; Dorard et al., 2008; Quirk, 2001; Wu et al., 2011). Other research has found that students who expected gambling to provide some form of relief or reward reported significantly more gambling-related problems, such as financial problems, and had significantly higher impulsivity scores (as measured by the Barratt Impulsivity Scale) compared to those without relief and reward expectations (Shed and Hodgins, 2009) and that impulsive decision making may be an attempt to change a negative emotional state (Tice et al., 2001).

This relationship between impulsive behaviors and emotional state is further supported by previous neuroscience research which

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has found that the prefrontal cortex and the amygdala both play key roles in emotion regulation (Ochsner and Gross, 2005; Ray and Zald, 2012), as well in impulsive behaviors, decision making, risk-taking, motor control, and reasoning (Kim and Lee, 2010; Manes et al., 2002; Bechara et al., 2000; Torresgrossa et al., 2008; Zeeb et al., 2010; Zeeb and Winstanley, 2011; Hinvest et al., 2011; Fecteau et al., 2007; Spinella, 2004; Krawczyk et al., 2011; Xie et al., 2011). In particular, an overlap of neural circuitry implicated in impulsivity, emotionally salient reasoning, and spatial working memory may occur in the medial prefrontal cortex. Of the fronto-subcortical circuits, the medial division of the orbitofrontal circuit, originating in the inferomedial prefrontal cortex, has sequential projections to medial aspects of the accumbens, to medial ventral portions of the pallidum, and the medial magnocellular division of the mediodorsal thalamic nucleus, back to the medial orbitofrontal cortex (Eldaief et al., 2011; Sripada et al., 2011; Bonelli and Cummings, 2007; Eslinger and Damasio, 1985). Dysfunction in this area may therefore disconnect frontal monitoring systems from limbic input, resulting in decreased impulse inhibition and emotional lability. Furthermore, medial prefrontal circuit dysfunction may result in disrupted interactions with the hippocampus resulting in deficits in spatial working memory (Churchwell and Kesner, 2011).

In the present study, we examined the relationship between emotion dysregulation and impulsivity within a sample of young adults. We hypothesized that those with more difficulties in emotion regulation (as measured by the Difficulties in Emotion Regulation Scale) would have higher rates of self-report impulsivity, impulsive behaviors, and demonstrate impaired functioning on neurocognitive measures of impulsive decision-making.

## 2. Methods

### 2.1. Subjects

Subjects were recruited for an ongoing longitudinal study evaluating impulsive behaviors in young adults aged 18–29 years old. Subjects were recruited from the community through print and online advertisements and were compensated with a \$50 gift card to a local department store. Inclusion criteria were (i) having gambled (defined as any betting of money on an undetermined outcome) in any form at least five times in the past 12-months; and (ii) having an ability to understand the study procedures and provide written informed consent. Exclusion criteria included any current Axis I psychiatric disorder (lifetime disorders were allowed) and meeting 3 or more criteria on the Structured Clinical Interview for Pathological Gambling (SCI-PG).

The study procedures were carried out in accordance with the Declaration of Helsinki. The Institutional Review Board of the University of Minnesota approved the study and the consent statement. After all study procedures were explained to the subjects, voluntary written informed consent was obtained.

### 2.2. Assessments

#### 2.2.1. Emotion dysregulation measure

Emotion dysregulation was assessed with the Difficulties in Emotion Regulation Scale (DERS) which has high internal consistency and good test-retest reliability (Gratz and Roemer, 2004). As a construct, this scale measures six areas of emotion regulation, including the tendency to respond to a negative emotion with a secondary negative emotion; the ability to engage in goal-directed behavior while experiencing negative emotion; the ability to refrain from acting impulsively when experiencing negative emotion; the tendency to attend to emotional states; the belief that little can be done to effectively regulate emotions; and

the ability to clearly identify emotional states. A higher total score indicates greater difficulties regulating emotions.

#### 2.2.2. Rater reported assessments

All subjects were screened for current and lifetime DSM-IV psychiatric disorders using the Mini International Neuropsychiatric Interview (MINI; Sheehan et al., 1998). The MINI assesses current and lifetime major depressive disorder, bipolar disorder, panic disorder, psychotic disorder, and antisocial personality disorder, as well as current suicidality, agoraphobia, social phobia, generalized anxiety disorder, obsessive compulsive disorder, posttraumatic stress disorder, anorexia and bulimia nervosa, and substance use disorders.

The Minnesota Impulsive Disorders Interview (MIDI; Grant, 2008) screens for the following Impulse Control Disorders (ICDs): compulsive buying, kleptomania, trichotillomania, intermittent explosive disorder, pyromania, and compulsive sexual behavior. For purposes of this study, the MIDI was used as a self-report screen (Odlaug and Grant, 2010) for lifetime ICDs as well as measuring impulsive behaviors (such as shopping problems, lifetime stealing, lifetime hair-pulling, lifetime violence [i.e., lost control and assaulted someone or damaged property], lifetime firesetting, and sexual obsessions) that do not meet full diagnostic criteria. In adult and adolescent populations, the MIDI has demonstrated excellent classification accuracy compared to diagnostic instruments (Grant et al., 2005, 2007).

Trained study staff asked all subjects about gambling behaviors (including frequency and money lost to gambling in the past three months) and current use of alcohol, nicotine, and any illicit drugs. Trained raters also assessed each subject using the Structured Clinical Interview for Pathological Gambling (SCI-PG) (Grant et al., 2004), which is a 10-item instrument assessing symptoms of DSM-IV criteria for pathological gambling. A score of 5 or more meets threshold for pathological gambling, while meeting 3 or 4 criteria indicates the presence of problem gambling (Johansson and Göttestam, 2003).

Trained raters administered the Yale-Brown Obsessive Compulsive Scale for Pathological Gambling (PG-YBOCS) (Pallanti et al., 2005), which is a 10-item measurement assessing gambling related urges and behaviors in the past week. The higher the score indicates more gambling related urges and behaviors.

#### 2.2.3. Self-report assessments

The following four self-report measures were included to provide a detailed picture of our sample. The Eysenck Impulsivity Questionnaire and Barratt Impulsivity Scale measure different forms of impulsivity. The Tridimensional Personality Questionnaire assesses for personality variables, while the Padua Inventory examines obsessions and compulsions.

Eysenck Impulsivity Questionnaire (EIQ) (Eysenck and Eysenck, 1978) is a valid, reliable, 54-item, self-report measure, assessing impulsivity (failure to evaluate risk), venturesomeness (consciousness and acceptance of risk), and empathy (recognition that feelings are being experienced by another person; added for variety in scale). Higher scores indicate higher levels of each subscale.

Barratt Impulsivity Scale, Version 11 (BIS) (Barratt, 1959; Patton et al., 1995) is a valid, reliable, 30-item, self-report measure. Subscales of the BIS include attentional impulsivity (inability to concentrate attention), motor impulsivity (acting without thinking), and nonplanning impulsivity (being present in the moment, lack of future thinking). Higher scores indicate higher levels of each subscale.

The Tridimensional Personality Inventory (TPQ) (Cloninger, 1987) is a valid, reliable, self-report, 100-item scale measures personality and includes three subscales: novelty-seeking (intense excitement in response to novel stimuli [a measure of impulsivity]), harm avoidance (intensely responding to aversive stimuli), and reward dependence (intensely responding to rewards). Each

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