NIH Public Access
Author Manuscript
J Psychiatr Res. Author manuscript; available in PMC 2013 May 01.

Published in final edited form as:
J Psychiatr Res. 2012 May ; 46(5): 651–658. doi:10.1016/j.jpsychires.2012.02.005.

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 ± 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.

Keywords

Emotion Regulation; Impulsivity; Young Adults; Addiction

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 & 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 towards 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; Fox et al., 2008; Nigg et al., 2005; Quirk, 2001; Tarter et al., 2003; Verdejo-García et al., 2008) and pathological gambling

(Hopley & Nicki, 2010; Matthews et al., 2009; Morasco et al., 2007; Shead & Hodgins, 2009; Slutske et al., 2005; Odlaug et al., 2011), suggesting that these constructs could predispose individuals to developing and/or maintaining impulsive behaviors and related psychopathology.

Numerous studies have linked emotion 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., 2011; Greeno & Wing, 1994; Magid et al., 2009); alcohol is often used to regulate postive 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 (Shead & 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 emotion state is further supported by previous neuroscience research which has found that the prefrontal cortex and the amydgala both play key roles in emotion regulation (Oschner & Gross, 2005; Ray & Zald, 2011), as well in impulsive behaviors, decision making, risk-taking, motor control, and reasoning (Kim & Lee, 2011; Manes et al., 2002; Bechara et al, 2000; Torregrossa et al, 2008; Zeeb et al, 2010; Zeeb & Winstanly, 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 & 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 dyregulation 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 & 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, 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 & 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 fire setting, 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; Grant et al., 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 DSMIV 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 & Götestam, 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 & 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 averse stimuli), and reward dependence (intensely responding to rewards). Each subscale has four dimensions. Higher scores indicate higher levels of each subscale.

The Padua Inventory – Washington State University Revision (PADUA; Burns et al., 1996) is a 39-item valid, reliable, self-report measure of obsessive and compulsive symptoms. This scale has 5 subscales measuring, contamination obsessions and washing compulsions, dressing/grooming compulsions, checking compulsions, obsessional thoughts of harm to self/others, and obsessional impulses of harm to self/others. A higher score on this measure indicates a higher level of obsessions and compulsions.

2.2.4. Cognitive Assessments—Decision-making, risk-taking, motor impulse control, and cognitive reasoning were evaluated using cognitive paradigms from the Cambridge Neuropsychological Test Automated Battery (CANTABeclipse, version 3, Cambridge Cognition Ltd, UK). Decision making and risk-taking behavior were assessed using the Cambridge Gambling Task (CGT), a task used in individuals with pathological gambling (Lawrence et al., 2009) and in multiple clinical samples (Clark et al., 2008; Manes et al., 2002). In this task, ten boxes (a mixture of red and blue boxes) are displayed at the top of a computer screen. At the bottom of the screen, subjects choose a rectangle with either the word red or blue displayed on the inside. Their choice indicates underneath which color box they think a yellow token is hidden. The yellow token has an equal chance of being under any one of the ten boxes. Subjects then bet on confidence of their decision through selecting an amount of points to bet. They start with a number of points displayed on the screen and can select a proportion of those points (5%, 25%, 50%, 75%, 95%) that are displayed in an ascending manner for the first five trials and then descending manner for the last five trials. Subjects are told to accumulate as many points as possible. The greater the overall proportion of points bet (the average proportion of the points that the subject chose to gamble on each trial) suggests greater risk taking. Higher quality of decision making scores (the proportion of trials on which subjects choose to gamble on the color with the most number of boxes) suggest better decision making.

To assess motor impulse control, subjects underwent the Stop Signal Task (SST; Logan et al., 1984; Aron et al., 2004). In this task, subjects receive a press pad with two buttons. On the computer screen, subjects see either a right-pointing encircled arrow or a left-pointing encircled arrow. Subjects are told to press the right button with their right index finger when they see the right-pointing arrow and to press the left button with their left index finger when they see the left-pointing arrow. After 16-trials, a beep is introduced with the arrow and subjects are told to refrain from pressing the button when they hear the beep. The greater stop signal reaction time (the time it takes for subjects to press the button after hearing the beep) suggests greater motor impulsivity.

To assess cognitive reasoning, subjects underwent the Spatial Working Memory Task (SWM; Owen, et al., 1990). On the computer screen several colored boxes are displayed (at first three colored boxes are shown). A blue token is hidden underneath one of the colored boxes. The subject selects one of the boxes to see if the blue token is underneath that box. If the token is underneath the selected box, the subject moves that token into the side bar to save that token. For the rest of that round, that box will no longer have a token hidden underneath. There are an equal number of tokens and boxes for each round. A round is complete when the subject has found and saved all tokens. A lower score strategy score (measured by counting the number of times the subject begins a new search with a different box) indicates a better strategy was used to find the tokens, suggesting better cognitive reasoning.

2.2.5. Data Analysis—Our main measure of emotion regulation, the DERS, yielded an overall sample mean of 68.69 ± 16.14. Based on their total score on the DERS, subjects were categorized into low emotion dysregulation (LED; n=26), average emotion dysregulation (AED; n=141), or high emotion dysregulation (HED; n=27) groups. Subjects scoring less than 1 standard deviation (SD) below the mean were categorized as LED, and subjects scoring above 1 SD above the mean were categorized as HED.

The three groups were analyzed using Pearson χ^2 and one-way analysis of variance (ANOVA) for demographic, clinical, and self-report data as appropriate. A Fisher's exact test was used in cases where count-level data did not consist of at least five observations. Poisson regression was used to analyze the data from the SCI-PG, since the SCI-PG was represented in counts and the distribution of the data represented a Poisson distribution (in which most of the individuals have a 0 response). Main effects were analyzed post-hoc using Tukey's Honestly Significant Differences (Tukey's HSD) and when significant group effects were found, the effect sizes were reported as Partial Eta Squared. Post-hoc correlational analysis was also performed. An α level of 0.05 was used to determine statistical significance.

3. Results

One-hundred and ninety-four subjects (27.8% female; 21.3 ± 3.32 years old; 91.8% single; 85.1% Caucasian) took part in the study. No significant demographic differences were found between groups, except that the high emotion dysregulation group had a significantly higher percentage of individuals who met criteria for a lifetime psychiatric diagnosis on the MINI (p=0.028; See Table 1). Further analysis found that all of these individuals met lifetime criteria for a major depressive episode.

No significant differences were found between groups with respect to gambling variables, current alcohol and drug use, or presence of a lifetime impulse control disorder (See Table 2). No significant differences were found between groups based on self report of current shopping problems (p=0.264), lifetime stealing (p=0.254), lifetime hair pulling (p=0.322), lifetime violence (i.e., lost control and assaulted someone or damaged property) (p=1.00), firesetting (p=0.280), or sexual obsessions (p=1.00).

Significant differences, however, were found between groups on two self-report impulsivity measures, on the BIS attentional (F=3.532, p=0.031) and nonplanning (F=5.436, p=0.005) impulsivity subscales. Significant differences were also found on the TPQ harm avoidance subscale (F=7.617, p=0.001) and the EIQ impulsivity scale demonstrated a trend toward significance (F=2.916, p=0.057).

Significant group differences were noted on the measure of cognitive reasoning (F=3.427, p=0.035), but no significant differences were found between groups on measures of risk taking, quality of decision making, or motor impulsivity (See Table 3).

Follow-up correlational analysis of the total sample indicated significant correlations between the total DERS score and total SCI-PG score (r=0.180, p=0.001); total PG-YBOCS score (r=0.165, p=0.003); EIQ impulsiveness (r=0.184, p=0.010), and empathy (r=0.150, p=0.037) subscales; BIS attentional (r=0.266, p<0.001) and nonplanning (r=0.241, p<0.001) impulsivity subscales; PADUA total score (r=0.152, p=0.035); and TPQ harm avoidance (r=0.317, p<0.001) and reward dependence (r=−0.180, p=0.012).

Significant correlations were also found with the self-report and behavioral impulsivity, personality, and obsession and compulsion measures. The EIQ impulsivity subscale was significantly correlated with total SCI-PG scores (r=0.281, p<0.001), total PG-YBOCS score (r=0.170, p=0.024); EIQ venturesomeness (r=0.224, p=0.003); BIS attentional (r=0.505, p<0.001), nonplanning (r=0.671, p<0.001), and non-planning (r=0.168, p=0.025) impulsivity subscales; and TPQ reward dependence subscale (r=0.589, p<0.001). The EIQ venturesomeness subscale was significantly correlated with total BIS motor impulsivity (r=0.184, p=0.014), total PADUA score (r=−0.219, p=0.003); and the TPQ novelty seeking (r=0.380, p<0.001) and harm avoidance (r=−0.330, p<0.001) subscales. BIS attentional impulsivity was significantly correlated with the BIS motor (r=0.428, p<0.001) and nonplanning (r=0.493, p<0.001) impulsivity subscales, and the TPQ novelty seeking (r=0.368, p<0.001) and harm avoidance (r=0.245, p=0.001) subscales. The BIS motor impulsivity subscale was significantly correlated with SCI-PG scores (r=0.283, p<0.001), BIS nonplanning impulsivity subscale (r=0.535, p<0.001), and the TPQ novelty seeking (r=0.565, p<0.001) subscale. The BIS non-planning impulsivity subscale is significantly correlated with SCI-PG scores (r=0.168, p=0.025), total PG YBOCS scores (r=0.185, p=0.013), and TPQ novelty seeking (r=0.526, p<0.001) and harm avoidance (r=0.155, p=0.040) subscales.

4. Discussion

To our knowledge, this is one of the first studies to investigate the relationship between emotion regulation and impulsivity in healthy young adults with no current psychopathology. Our main measure of emotion regulation, the DERS, yielded an overall sample mean of 68.69 ± 16.14, which is lower than the average of 75 to 80 found in nonclinical samples of college students and community adults (Gratz & Roemer, 2004; Salters-Pedneault et al., 2006, Vujanovic et al., 2008). Consistent with our hypothesis, we found that subjects who reported high levels of emotion dysregulation also scored significantly higher on two self-report impulsivity measures (BIS attentional and non-planning impulsivity subscales), but failed to find significantly higher levels of impulsive behaviors, such as drug and alcohol use, gambling stealing, buying, being out of control, deliberately setting fires, or sexual obsessions. We also found significant positive correlations between emotion dysregulation and self-report impulsivity measures. Since we did not find increased impulsive behaviors, but higher self reported impulsivity, these findings are partially consistent with past research suggesting that impulsive behaviors (such as drinking alcohol and smoking) may result from a lack of adaptive emotion regulation strategies (Selby et al., 2008; Morrell et al., 2010; Wegner et al., 2002; Whiteside & Lynam, 2003). A possible reason for why we did not find significantly higher rates of impulsive behaviors is that we excluded individuals who met criteria for a current Axis I disorder. This differs from past research, which mainly used samples of clinical populations with current psychopathology (Fox et al., 2007; Fox et al., 2008). Combining our findings with past research indicate that there is a relationship between emotion regulation and impulsivity. They also suggest the possibility that poor emotion regulation skills and believing one is impulsive may lead to behavioral impulsivity and thus may increase one's risk for developing an addiction or psychopathology.

An unexpected finding was the association between high emotion dysregulation with harm avoidance, a personality trait that reflects having strong reactions towards aversive stimuli. Elevated levels of harm avoidance have been found in samples of pathological gamblers (Forbush et al., 2008), individuals who have eating disorders with impulse control disorders (Fernández-Aranda et al., 2007), those who have attempted suicide (Giegling et al., 2009) and individuals with depression (Mulder et al., 1994). One possibility is that those with intense responses towards negative stimuli may have a harder time regulating their emotions. Past literature has suggested that individuals who experience intense emotional responses may pursue situations that evoke positive emotions and avoid situations that result in negative emotions (Lynch et al., 2001). Furthermore, individuals who experience intense emotions may not believe that they can successfully regulate their emotions, and therefore may be unwilling to try to regulate their emotions (Flett et al., 1996). Thus it is possible that those who experience intense emotions may have a more difficult time regulating their emotions and therefore act impulsively to gain immediate relief from emotional distress.

Contrary to our hypothesis, we did not find that the high emotion dysregulation group had overall significantly greater cognitive impairment compared to the other two groups. This finding suggests that perhaps emotion regulation is not related to motor inhibition (as measured by the SSRT) or risky decision making (as measured by the CGT quality of decision making and proportion bet). Those lower in emotion dysregulation, however, displayed greater cognitive reasoning skills. Current research has found that the prefrontal cortex is involved in reasoning (Krawczyk et al., 2011) and that inhibition of the prefrontal cortex impairs emotion control (Volman et al., 2011), suggesting the possibility that reasoning ability may impact emotion regulation proficiency. The prefrontal cortex has also been associated with activity in the hypothalamic–pituitary–adrenal (HPA) axis (a key component of stress regulation) in response to distress (Kern et al., 2008). The self-medication theory (Khantzian, 1985) proposes individuals may ingest substances to alter the brain's HPA axis activity to achieve a desired state of internal stimulation (Goeders, 2002). Literature has reported that heightened HPA activity is significantly associated with hyperactivity/impulsivity and emotional problems (Hatzinger et al., 2007) and that children with the most severe behavioral problems had the highest levels of cortisol dysregulation (a measurement of HPA-axis activity; Ruttle et al., 2011). The prefrontal cortex is also active the dorsal cognitive neurocircuit, which also includes the hippocampus and dorsal anterior cingulated cortex. The dorsal neurocircuit pathway has been found in past research to play a role in the effortful control of affective states (the ability to inhibit a dominant emotional response and instead act on a minor emotion) and is a pathway in which emotions can impact cognitive processes (Phillips et al., 2003). Increased activation in the dorsal anterior cingulate gyrus has been linked with heightened impulsivity (Brown et al., 2006) as well as to attending to subjective emotional states and experiences, pain perception, uncertainty, and anticipatory arousal (Phillips et al., 2003). Thus, it is possible that increased activation of this pathway may lead to increased awareness of emotions as well as impulsivity and that these individuals may need greater activation of regulatory mechanisms (Brown et al., 2006) to control impulsive responses to emotional stimuli. Overall, future research may want to further investigate how these cognitive dimensions play a role the relationship between emotion regulation and impulsivity, as well as examining the function of the HPA-axis and the dorsal neurocircuit pathway.

Correlational analysis found that emotion dysregulation was positively correlated with measures of impulsivity, obsessions and compulsions, harm avoidance, and empathy, and negatively correlated with reward dependence. These results highlight the role of emotion dysregulation in impulsivity and suggest that emotion dysregulation plays a part in many traits and may be a useful assessment tool when examining potential risk factors in the development of psychopathology.

Several limitations exist within our findings. First, only one emotion regulation measure was administered. Future studies may want to use objective, such as physiological (i.e., cortisol levels), and subjective measures of emotions to examine different aspects of emotions and their relationship with impulsivity. Second, emotional states have been found to impact cognitive processing (Blair et al., 2007) and therefore, further investigations of how current emotional states impact emotion regulation and impulsivity are needed. Third, our sample was between the ages of 18 and 29 and predominantly male. Emotional stability and impulsivity have been found to respectively improve and decrease with age (Williams, 2006; Eysenck et al., 1985) and differ based on gender (Brebner, 2003; Stoltenberg, 2008). Therefore, our results may not generalize to individuals outside of the young adult cohort and may not accurately describe the relationship of emotion regulation and impulsivity in females. Longitudinally assessing emotions and impulsivity in a gender-balanced sample would help to address these limitations. Furthermore, the measures we used may not accurately capture differences in impulsive behaviors between groups (i.e., days per week of alcohol consumption may not be detailed enough to accurately measure drinking behavior) and it is possible that these individuals behave impulsivity in other ways not measured by the questionnaire, such as having unprotected intercourse with multiple partners (Hoyle et al., 2000), aggression (Pavlov et al., 2011), driving fast (Vavrik, 1997), and practicing risk-taking sports (Cazenave et al., 2007). Additionally, more longitudinal data are needed to evaluate if emotion dysregulation predates, is subsequent to, or co-occurs with impulsivity to gain a more comprehensive understanding of the relationship between emotion regulation and impulsivity.

Despite these limitations, our results are of potential clinical importance. Clinicians may wish to examine emotion regulation to see if individuals will use effective coping mechanisms or maladaptive strategies, such as impulsive behaviors, in response to the inevitable stresses of life. Continued use of dysfunctional coping skills to regulate affect may result in a range of impulsive behaviors (i.e., substance dependence, pathological gambling). From a prevention perspective, early identification of emotion dysfunction and educating these individuals about effective coping strategies may help to decrease overall rates of addictions and other psychiatric disorders.

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Table 1

Demographic Information for 194 Young Adults Gamblers

		Low Emotion Dysregulation (N=26)	Average Emotion Dysregulation (N=141)	High Emotion Dysregulation (N=27)	Person Chi Square/ F-Statistic	P-Value
Gender	Female	7 (26.92%)	38 (26.95%)	9 (33.33%)	$0.472^{\chi,A}$	0.790
Marital status	Single	22 (84.62%)	133 (94.33%)	23 (85.19%)	$4.523^{\chi,A}$	0.104
Education	Some college or less	18 (69.2%)	107 (75.9%)	19 (70.4%)	$0.752^{\chi,B}$	0.687
	College grad or more	8 (30.8%)	34 (24.1%)	8 (29.6%)		
Age	Mean ± St. Dev.	22.12 ±3.59	21.13 ± 3.21	21.72 ±3.67	$1.120^{FS,C}$	0.328
Employment/school	Work (part-time or full time)	8 (30.77%)	28 (19.86%)	5 (18.52%)		
	Student	10 (38.46%)	66 (46.81%)	12 (44.44%)	$7.683^{\chi,D}$	0.262
	Work and school	6 (23.08%)	42 (29.79%)	6 (22.22%)		
	Unemployed or other	2 (7.69%)	5 (3.55%)	4 (14.81%)		
Race	Caucasian	22 (84.62%)	122 (86.52%)	21 (77.78%)	$1.366^{\chi,A}$	0.505
	Lifetime psychiatric disorder	1 (3.85%)	13 (9.22%)	7 (25.93%)	NA^{F}	0.028

All values are N (%), unless otherwise specified

$^{\chi}$– Pearson Chi-Squared;

^{FS}– F-Statistic;

^{F}– Fisher's Exact Test;

^{A}– 2 df;

^{B}– 5 df;

^{C}– 2, 193 df;

^{D}– 11 df

Abbreviations: df – degrees of freedom

Table 2

Impulsive Behaviors in 194 Young Adults Gamblers

	Low Emotion Dysregulation (N=26)	Average Emotion Dysregulation (N=141)	High Emotion Dysregulation (N=27)	Person Chi Square/ F-Statistic	DF	P-Value
Money lost due to gambling in the past 3 months, Mean ± St. Dev.	\$79.06 ±97.61	\$128.70 ±338.60	\$145.53 ±275.87	0.210^{FS}	2, 193	0.811
Average number of minutes gambled per gambling episode, Mean ± St. Dev.	168.75 ± 114.83	150.12 ±286.32	163.00 ±96.69	0.047^{FS}	2, 193	0.954
PG-YBOCS total score, Mean ± St. Dev.	2.72 ±2.390	2.54 ±2.781	2.68 ±2.479	0.066^{FS}	2, 193	0.936
Number of SCI-PG criteria met, N (%) 0	18 (69.23%)	92 (65.25%)	14 (51.85%)			
1	7 (26.92%)	41 (29.08%)	13 (48.15%)	0.570^{W}	8	0.752
2	1 (3.85%)	8 (5.67%)	0 (0.00%)			
Current alcohol user, N (%)	16 (61.54%)	100 (70.92%)	18 (66.67%)	0.990^{χ}	2	0.610
Days per week of alcohol consumption, Mean ± St. Dev.	1.24 ± 1.41	1.13 ± 1.25	1.13 ± 1.64	0.070^{χ}	2	0.932
Current cannabis user, N (%)	3 (11.54%)	19 (13.48%)	6 (22.22%)	NA	NA	0.428^{F}
Current smoker, N (%)	3 (11.54%)	20 (14.18%)	4 (14.81%)	NA	NA	1.000^{F}
Presence of an impulse control disorder*, N (%)	2 (1.15%)	12 (6.90%)	1 (0.57%)	NA	NA	0.907^{F}

*Only 174 subjects completed the Minnesota Impulsive Disorder Interview (self-report scale assessing for presence of compulsive shopping, kleptomania, trichotillomania, lifetime violence, fire-setting, and sexual obsessions) at baseline

^{F} – Fisher's Exact Test;

^{FS} – F-Statistic;

$^{\chi}$ – Pearson Chi-Squared;

^{W} – Wald Chi-Squared

Abbreviations: PG-YBOCS – Yale-Brown Obsessive Compulsive Scale for Pathological Gambling; SCI-PG – Structured Clinical Interview for Pathological Gambling; df – degrees of freedom

Table 3

Self-Report and Cognitive Measures in 194 Young Adult Gamblers

		Low Emotion Dysregulation (N=26)	Average Emotion Dysregulation (N=141)	High Emotion Dysregulation (N=27)	F-Statistic[A]	P-Value	Homogenity (Tukey HSD)	Partial Eta Squared
Self-Report Measures								
EIQ	Impulsivity	5.04 ± 4.34	6.64 ± 3.75	7.60 ± 3.79	2.916	0.057	L=A<A=H	0.031
	Venturesomeness	11.24±3.40	10.82 ± 3.48	11.04 ± 3.45	0.173	0.842		
	Empathy	10.56 ± 3.31	11.94 ± 3.45	12.44 ± 3.77	2.125	0.122		
BIS	Attentional Impulsivity	14.52 ± 3.28	15.80 ± 3.22	17.08 ± 4.38	3.532	0.031	L=A<A=H	0.037
	Motor Impulsivity	21.64 ± 4.55	22.31 ± 3.94	23.40 ± 3.81	1.260	0.287		
	Nonplanning Impulsivity	19.96 ± 5.30	22.80 ± 4.59	24.28 ± 5.27	5.436	0.005	L<A=H	0.056
TPQ	Novelty Seeking	15.64 ± 5.50	17.13 ± 5.15	18.08 ± 5.87	1.376	0.255		
	Harm Avoidance	5.20 ± 4.56	8.01 ± 4.50	11.16 ± 7.85	7.617	0.001	L=A<H	0.076
	Reward Dependence	18.92 ± 4.35	17.58 ± 4.87	16.24 ± 4.57	1.974	0.142		
PADUA	Total score	11.72 ±11.44	13.34 ±10.96	16.04 ±14.76	0.908	0.405		
Cognitive Measures								
CGT	Overall Proportion Bet	0.527 ± 0.12	0.520 ± 0.14	0.549 ± 0.12	0.541	0.583		
	Quality of Decision Making	0.961 ± 0.08	0.973 ± 0.05	0.943 ± 0.09	2.676	0.072		
SST	SSRT (last half)	170.08 ± 41.97	172.53 ± 46.69	185.22 ± 72.85	0.754	0.472		
SWM	Strategy	25.92 ± 6.14	27.87± 5.93	30.28 ± 5.58	3.427	0.035	L=A<A=H	0.036

All Scores are Mean ± Standard Deviation

[A] – All tests had 2, 193 df

Abbreviations: EIQ – Eysneck Impulsivity Questionnaire; BIS – Barratt Impulsivity Scale; TPQ – Tridimensional Personality Questionnaire; QoLI – Quality of Life Inventory; RSE – Rosenberg Self Esteem Scale; CGT – Cambridge Gambling Task; SST – Stop Signal Task; SSRT – Stop Signal Reaction Time; SWM – Spatial Working Memory Task; df – degrees of freedom; HSD – Honestly Significant Differences