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A Preliminary Experimental Investigation of Emotion Dysregulation and Impulsivity in Risky Behaviours

Nicole H. Weiss,

Yale University, School of Medicine

Matthew T. Tull,

University of Mississippi Medical Center, Department of Psychiatry and Human Behavior

Lindsey T. Davis,

Ralph H. Johnson VA Medical Center, Savannah Primary Care Clinic

Jasmin Searcy,

Jackson State University, Department of Psychology

Iman Williams, and

Jackson State University, Department of Psychology

Kim L. Gratz

University of Mississippi Medical Center, Department of Psychiatry and Human Behavior

Abstract

This prospective experimental study sought to examine the unique effects of emotion dysregulation and impulsivity on risky behaviors over time. To this end, 20 African American women enrolled in a historically black university in the southern United States were randomly assigned to receive one of two brief empirically-supported skills training modules (i.e., emotion modulation [EM] or impulsivity reduction [IR]). Participants completed measures of emotion dysregulation, impulsivity, and past-week risky behaviors before (pre-) and one week after (post-) the experimental manipulation. Participants assigned to the EM condition reported significant improvements from pre- to post-manipulation in overall emotion dysregulation (as well as all specific dimensions of emotion dysregulation other than lack of emotional awareness), as well as two dimensions of impulsivity: negative and positive urgency. Participants assigned to the IR condition reported a significant decrease in one dimension of impulsivity (lack of premeditation) from pre- to post-manipulation. Findings also revealed a significant effect of time on risky behaviors, with participants reporting significantly fewer past-week risky behaviors at the post- (vs. pre-) manipulation assessment. Finally, changes in emotion dysregulation from pre- to post-manipulation accounted for the observed reduction in risky behaviors over time (above and beyond changes in impulsivity dimensions). Results highlight the relevance of emotion dysregulation to risky behaviors and suggest that treatments targeting emotion dysregulation may be useful in reducing risky behaviors.

Keywords

Emotion dysregulation; impulsivity; risky behaviors; African American; experimental design

Over the past decade, researchers have become increasingly interested in examining the emotional and cognitive factors that underlie or maintain risky behaviors (i.e., any behavior that puts one at risk for a negative outcome, be it physical, emotional, social, or financial), with a particular focus on behaviors that place an individual at risk for negative health or safety outcomes (e.g., substance use and violence; Lejuez et al., 2003; Webster & Jackson, 1997). Literature suggests that engagement in risky behaviors, such as unprotected sex, substance use, and risky driving behaviors, peaks during emerging adulthood (i.e., ages 18–25; Arnett, 1992; Bachman, Johnston, O'Malley, & Schulenberg, 1996). Further, there is some evidence to suggest that these risks might be particularly pronounced among African American individuals, with past studies demonstrating greater rates of some risky behaviors among African American (vs. White and Latino/a) young adults (e.g., risky sexual behavior and problematic alcohol use; Dariotis, Sifakis, Pleck, Astone, & Sonenstein, 2011; Mulia, Yu Ye, Greenfield, & Zeng, 2009). Given the clinical relevance and public health significance of these behaviors, as well as their demonstrated relations to other negative clinical outcomes (e.g., physical injury, criminal behavior, legal problems; Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994), investigation of the mechanisms underlying risky behaviors among African American emerging adults is needed. Two mechanisms worth investigating in this regard are emotion dysregulation and impulsivity, both of which have been found to be associated with risky behaviors within clinical and nonclinical populations (e.g., Cyders, Flory, Rainer, & Smith, 2009; Donohew, Zimmerman, Cupp, Novak, Colon, & Abell, 2000; Messman-Moore, Walsh, & DiLillo, 2010; Ryb, Dischinger, Kufera, & Read, 2006; Tull, Weiss, Adams, & Gratz, 2012; Weiss, Tull, Viana, Anestis, & Gratz, 2012).

As defined here, emotion dysregulation is a multi-faceted construct involving: (a) a lack of awareness, understanding, and acceptance of emotions; (b) difficulties controlling behaviors when experiencing emotional distress; (c) lack of access to adaptive strategies for modulating the duration and/or intensity of aversive emotional experiences; and (d) an unwillingness to experience emotional distress as part of pursuing meaningful activities in life (Gratz & Roemer, 2004). Recent evidence highlights the role of emotion dysregulation in risky behaviors (Tull et al., 2012; Weiss et al., 2012). Individuals may come to rely on risky behaviors that function to immediately reduce or distract attention away from aversive emotions (Heatherington & Baumeister, 1991). However, risky behaviors are likely to exacerbate distress in the long-term. For example, reliance on risky behaviors to reduce or escape emotional distress may reduce experiences in which the adaptive modulation of emotions is reinforced (Fischer, Smith, Spillane, & Cyders, 2005). Risky behaviors may also contribute to the experience of more negative emotions (e.g., guilt, shame) that further drive risky behaviors. Finally, because risky behaviors may exacerbate distress in the long-term, individuals may perceive themselves as having less access to effective emotion regulation strategies. Consistent with this theoretical literature, empirical studies have found emotion dysregulation to be positively associated with deliberate self-harm (Gratz & Roemer, 2008;

Gratz & Tull, 2010a), binge eating (Whiteside, Chen, Neighbors, Hunter, Lo, & Larimer, 2007), risky sexual behavior (Messman-Moore et al., 2010; Tull et al., 2012), substance use (Bonn-Miller, Vujanovic, & Zvolensky, 2008), and aggressive behavior (Gratz, Paulson, Jakupcak, & Tull, 2009).

An extensive body of literature has also identified impulsivity as one factor that places individuals at risk for engagement in risky behaviors (e.g., Eysenck & Eysenck, 1977; Zuckerman, 1984). Although multiple definitions of impulsivity have been proposed in the literature (see Evenden, 1999; Perry & Carroll, 2008), recent literature suggests that impulsivity is best defined as a multi-faceted construct consisting of five dimensions: (a) negative urgency (the tendency to act impulsively when experiencing negative affect); (b) positive urgency (the tendency to act impulsively when experiencing positive affect); (c) lack of premeditation (failure to reflect on the consequences of an act before engaging in that act); (d) lack of perseverance (an inability to focus or follow through on difficult or boring tasks); and (e) sensation seeking (the tendency to enjoy and pursue activities that are exciting and an openness to trying new experiences; Cyders, Smith, Spillane, Fischer, Annus, & Peterson, 2007; Whiteside & Lynam, 2001). These dimensions of impulsivity have been found to be positively associated with a range of risky behaviors (e.g., risky sexual behavior and substance abuse; Cyders et al., 2007; Whiteside & Lynam, 2001, 2003; Whiteside, Lynam, Miller, & Reynolds, 2005). Notably, however, recent investigations have found that emotion-related dimensions of impulsivity (i.e., negative and positive urgency) are more strongly associated with risky behaviors than other dimensions of impulsivity (Cyders et al., 2009; Cyders & Smith, 2008a; Cyders et al., 2007; Zolowski, Cyders, & Smith, 2009). Together, these aforementioned findings suggest that risky behaviors may be more strongly related to maladaptive ways of responding to emotions or difficulties controlling behaviors in the context of emotional distress.

The goal of the present study was to extend extant literature on the role of emotion dysregulation and impulsivity in risky behaviors by using an innovative prospective experimental design. Notably, no studies to date have concurrently examined the effect of emotion dysregulation or impulsivity on risky behaviors, precluding determination of the causal role of these mechanisms in such behaviors. Thus, this study sought to examine the unique effects of emotion dysregulation and impulsivity on risky behaviors over time by randomly assigning participants to one of two brief empirically-supported skills training modules (i.e., emotion modulation [EM] or impulsivity reduction [IR]). Use of these skills training modules as experimental manipulations may elucidate the nature and direction of the relationships between emotion dysregulation, impulsivity, and risky behaviors (see Coffey, Stasiewicz, Hughes, and Brimo [2006] for a similar methodological approach).

We predicted that participants assigned to the EM (vs. IR) condition would report greater reductions in emotion dysregulation (both overall and across specific dimensions of emotion dysregulation), as well as the impulsivity dimensions of negative and positive urgency (which overlap considerably with the conceptual definition of emotion dysregulation used here and have been found to be closely related to emotion dysregulation; Cyders & Smith, 2007, 2008b; Gratz & Roemer, 2004; Weiss, Tull, Anestis, & Gratz, 2013). Given that the skills taught in the IR condition focus on reducing rash action (e.g., examining short- and

long-term consequences of risky behaviors), we predicted that individuals assigned to the IR (vs. EM) condition would report significantly greater reductions in lack of premeditation. No *a priori* hypotheses were made regarding the effect of EM and IR conditions on the impulsivity dimensions of sensation seeking and lack of perseverance. Finally, we predicted that participants would report significantly fewer past-week risky behaviors one week after the experimental manipulation (compared to the week before the manipulation), and that changes in emotion dysregulation and impulsivity from pre- to post-manipulation would account for the observed reduction in risky behaviors over time.

Method

Participants

Participants were 23 African American women attending an urban historically black university in the southern United States. Participants ranged in age from 18 to 27, with an average age of 20.74 ($SD = 2.00$). Approximately half the participants (52%) reported an annual household income under \$40,000, and 61% were not employed. All participants were full-time students.

Experimental Manipulations

The EM and IR manipulations were adapted from an empirically-supported acceptance-based emotion regulation group therapy (ERGT) for self-harm among women with borderline personality pathology (Gratz & Gunderson, 2006; Gratz & Tull, 2011). ERGT is a 14-week group therapy designed to teach patients adaptive ways of responding to emotions, with an emphasis on the control of behaviors in the presence of emotions (vs. the control of emotions themselves). Specific skills focus on increasing the: (a) awareness, understanding, and acceptance of emotions; (b) ability to engage in goal-directed behaviors and control impulsive behaviors when experiencing negative emotions; (c) flexible use of situationally-appropriate strategies to modulate the intensity and/or duration of emotional responses (versus eliminating emotions entirely); and (d) willingness to experience negative emotions in pursuit of meaningful activities (Gratz & Gunderson, 2006; Gratz & Roemer, 2004). ERGT has been shown to significantly reduce deliberate self-harm and other impulsive behaviors among women with borderline personality pathology (Gratz & Tull, 2011).

EM and IR manipulations covered material presented in single ERGT sessions and were adapted by author NHW (with assistance from MTT and KLG) for use in a sample without a known history of deliberate self-harm (i.e., the focus of the sessions was on strategies for modulating emotions and reducing impulsive behavior more broadly versus focusing on deliberate self-harm in particular). Single ERGT modules targeted distinct factors (see Gratz & Gunderson, 2006) and did not overlap (see Table 1). The EM condition was comprised of strategies to modulate the intensity and/or duration of emotional arousal in a flexible, situationally-appropriate manner, including distraction (i.e., noticing intense and/or aversive emotions and then temporarily directing attention toward something other than the distressing emotion) and emotional approach (e.g., getting in touch with emotions, allowing oneself to experience emotions, and paying attention to the information being provided by

emotions). The IR condition taught skills for decreasing rash action and impulsive behavior, including distraction/delay (i.e., directing attention away from urges to engage in impulsive behavior as a means of allowing the urge to pass), behavioral substitution (i.e., replacing impulsive behaviors with healthier behaviors that serve a similar function), pros and cons (i.e., attending to the long-term consequences of impulsive behavior), and consequence modification (i.e., changing the contingencies of impulsive behavior by rewarding attempts to resist urges for impulsive behavior and eliminating rewards associated with engagement in impulsive behavior). Notably, skills presented in the EM and IR conditions closely map on to our definitions of emotion regulation and impulsivity, respectively, such that EM skills targeted the flexible use strategies to modulate emotional responses in order to meet individual goals and situational demands, whereas IR skills aimed to increase awareness of the negative consequences and long-term effects of rash, unplanned actions.

To reduce experimenter bias, detailed experimental manipulation scripts were developed for the EM and IR conditions. Authors NHW and LTD (clinical psychology graduate students with over three years of clinical training) delivered the EM and IR manipulations after being trained to adherence by MTT and KLG. All manipulations were provided to participants in an individual format. Weekly meetings throughout the study ensured experimenters did not deviate from the EM and IR manipulation protocols. Authors NHW and LTD completed an equal number of EM (5) and IR (5) sessions once study dropout was accounted for. Both EM and IR sessions lasted approximately 60 minutes ($M_{EM}=58.09$, $SD_{EM}=6.58$; $M_{IR}=60.83$, $SD_{IR}=6.53$), and were followed by one-week of daily skills practice specific to the skills training module. Participants were given explicit instructions on using skills outside of the lab. A manipulation check was included to ensure validity of the experimental protocols (see results).

Measures

Self-report measures of emotion dysregulation, impulsivity, and past-week engagement in risky behaviors were administered before the experimental manipulation and one-week post-manipulation.

The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) is a 36-item self-report measure that assesses individuals' typical levels of emotion dysregulation across six domains: non-acceptance of negative emotions, difficulties engaging in goal-directed behaviors when distressed, difficulties controlling impulsive behaviors when distressed, limited access to emotion regulation strategies perceived as effective, lack of emotional awareness, and lack of emotional clarity. The DERS has been found to demonstrate good test-retest reliability ($\rho_T = .88$, $p < .01$) and adequate construct and predictive validity (Gratz & Roemer, 2004; Gratz & Tull, 2010b), and to be significantly associated with objective measures of emotion regulation, including behavioral (Gratz, Bornovalova, Delany-Brumsey, Nick, & Lejuez, 2007; Gratz, Rosenthal, Tull, Lejuez, & Gunderson, 2006; Tull, Gratz, Latzman, Kimbrel, & Lejuez, 2010) and physiological (Vasilev, Crowell, Beauchaine, Mead, & Gatzke-Kopp, 2009) measures. Items were recoded so that higher scores indicate greater emotion dysregulation, and a sum was calculated. Internal consistency in the current sample was good for the overall scale ($\alpha_s = .96$) and for the subscales ($\alpha_s = .82$ to $.95$).

The UPPS-P Impulsive Behavior Scale (UPPS-P; Cyders et al., 2007) is a 59-item self-report measure that assesses five distinct facets of impulsivity: lack of perseverance, negative urgency, positive urgency, lack of premeditation, and sensation seeking. Participants rate the extent to which each item applies to them on a 4-point Likert-type scale (1=rarely/never true, 4=almost always/always true). Scores are provided for each of the five dimensions of impulsivity. The five scales have been found to have good convergent validity and good discriminant validity from each other (Cyders et al., 2007). Internal consistency coefficients in the current sample were adequate (α s = .69 to .92).

The Impulsive Behavior Scale (IBS; Rossotto, Yager, & Rorty, 1998) is a 25-item, self-report questionnaire that assesses past-week engagement in a variety of risky behaviors, including consuming large quantities of alcohol, engaging in unprotected sexual intercourse, deliberate self-harm, driving while under the influences of drugs and/or alcohol, and impulsive spending. Participants report the frequency of each behavior during the past week. Items are summed to create a measure of overall frequency of past-week risky behaviors. The IBS has been found to have adequate reliability and validity (Bender, Gordon, Bresin, & Joiner, 2010; Peñas-Lledó & Waller, 2001).

Finally, all participants completed a demographics form assessing age, education, employment, and family income in the past year. These characteristics were examined as potential covariates.

Procedure

All study procedures were conducted in compliance with the university's Institutional Review Board. A study announcement was made in undergraduate psychology courses at Jackson State University. African American women interested in participating were asked to provide their contact information to a graduate research assistant. Of the 30 women who provided their information, 4 could not be reached and 3 withdrew interest. Thus, a total of 23 participants were randomly assigned to receive the EM or IR manipulation, and scheduled for the first of two sessions. Following provision of written informed consent at the beginning of Session 1, participants completed a series of questionnaires (see Measures) and then received an hour-long skills training session. Participants were then scheduled to complete the follow-up assessment 6–8 days later (M days=6.90, SD days=0.45). Participants were also provided with explicit instructions for using the skills outside of the lab, which included daily monitoring of strategies employed (e.g., distraction, behavior substitution), as well as antecedents (e.g., emotion) and consequences (e.g., effectiveness of the strategy) of skillful behavior. The monitoring form was collected at post-assessment and scored (with scores ranging from 0–100% [i.e., 0–1] complete). No significant between-group differences in homework completion were detected, $M_{EM}=.55$, $SD_{EM}=.45$; $M_{IR}=.68$, $SD_{IR}=.43$; $t=-.64$, $p=.53$. Three participants withdrew from the study prior to completing Session 2 (resulting in a final sample of 20 participants; 10 per condition). Session 2 was conducted by graduate research assistants blind to condition. During this session, participants completed the same questionnaires presented in Session 1 (i.e., DERS, UPPS-P, and IBS). Participants were compensated \$10 at the end of the session.

Results

Preliminary Analyses

Prior to conducting the primary analyses, t-tests and chi-square analyses were conducted on demographic factors (i.e., age, income, and employment) and pre-manipulation scores on the primary dependent variables (i.e., DERS, UPPS-P, and IBS) to determine equivalence across conditions. Results indicate no significant between-group differences ($t_s < 1.71$, $\chi^2_s < 7.50$, $p_s > .10$), with one exception: the EM condition reported significantly higher scores than the IR condition on negative urgency ($t = 2.91$, $p < .05$, Cohen's $d = 2.91$).

Participants reported an average of 4.75 ($SD=6.60$) risky behaviors during the week prior to the pre-manipulation assessment. Descriptive data, as well as intercorrelations between the primary variables of interest, are presented in Table 2.

Manipulation Check

A series of 2 (condition: EM vs. IR) \times 2 (time: pre- vs. post-manipulation) repeated measures analyses of variance (ANOVAs) were conducted to examine between-group differences in changes in emotion dysregulation and impulsivity over time (see Table 3). Results revealed a significant main effect of time on emotion dysregulation (both overall and across all specific dimensions other than emotional nonacceptance), as well as a significant time \times condition interaction for overall emotion dysregulation and the specific dimensions of difficulties engaging in goal-directed behaviors when distressed, lack of emotional awareness, and lack of emotional clarity. Post-hoc paired sample t-tests revealed that whereas participants in the EM condition reported significant decreases over time in overall emotion dysregulation and all specific dimensions other than emotional nonacceptance (see Table 3; Cohen's d s ranging from .78 to 1.09), participants in the IR condition evidenced no significant changes over time on any dimension of emotion dysregulation (and all effect sizes were small; Cohen's d s ranging from .07 to .30).

Results also revealed a significant main effect of time on negative urgency, positive urgency, and (lack of) premeditation, as well as a significant time \times condition interaction for of (lack of) premeditation and negative urgency (see Table 3). Post-hoc paired samples t-tests revealed that participants in the IR condition reported significant decreases over time in (lack of) premeditation (Table 3; Cohen's $d=1.36$), whereas participants in the EM condition reported significant decreases in both negative urgency (Cohen's $d=1.12$) and positive urgency (Cohen's $d=.83$). Of note, all non-significant effects in these analyses were accompanied by small to medium effect sizes (Cohen's d .46).

Primary Analyses

A 2 (condition: EM vs. IR) \times 2 (time: pre- vs. post-manipulation) repeated measures ANOVA was conducted to examine between-group differences in changes in risky behaviors over time. Results revealed a significant main effect of time (Wilkes $\lambda = .72$, $F = 7.18$, $p = .02$, $\eta_p^2 = .29$), such that participants reported a significant decrease in risky behaviors from pre- to post-manipulation [$M(SD)_{\text{Pre-Manipulation}}=5.11(6.90)$, M

(SD)_{Post-Manipulation}=1.08(1.47), Cohen's d =.62]. The time \times condition interaction was not significant (Wilkes λ =1.00, F =.002, p =.97, η_p^2 <.001).

Finally, we examined whether changes in emotion dysregulation and/or impulsivity accounted for the reduction in risky behaviors over time. First, residualized gain scores (Tucker, Damarin, & Messick, 1966) were calculated for pre- and post-manipulation scores on risky behaviors, overall emotion dysregulation, and the UPPS-P impulsivity dimensions of (lack of) premeditation, negative urgency, and positive urgency. Next, a hierarchical multiple regression analysis was conducted with the impulsivity residual scores entered in the first step of the model, the overall emotion dysregulation residual score entered in the second step of the model, and the risky behaviors residual score serving as the dependent variable. Changes in impulsivity accounted for 11% of the variance in change in risky behaviors over time (F =.66, p =.59); however, none of the impulsivity dimensions emerged as significant unique predictors in this step (see Table 4). The final model including change in overall emotion dysregulation accounted for 44% of the variance in change in risky behaviors (F =2.93, p =.06). In this step, change in overall emotion dysregulation accounted for unique variance in the change in risky behaviors over time, above and beyond changes in (lack of) premeditation, negative urgency, and positive urgency (see Table 4).

Discussion

Findings of the present study extend the literature on the mechanisms underlying risky behaviors by examining the effects of experimental manipulations targeting a reduction in emotion dysregulation and impulsivity on risky behaviors. The results of this study provide preliminary experimental support for the role of emotion dysregulation in risky behaviors, revealing that improvements in emotion dysregulation from pre- to post-manipulation accounted for the significant reduction in risky behaviors observed over time. This finding suggests that maladaptive ways of responding to emotions, such as difficulties controlling behaviors when distressed and lack of access to adaptive strategies for modulating the duration and/or intensity of aversive emotional experiences, may lead to greater engagement in risky behaviors. For example, individuals who are unwilling or unable to approach or modulate emotional distress may engage in risky behaviors to obtain short-term relief from emotional states perceived as aversive. Likewise, individuals who experience difficulties controlling their behaviors in the context of emotional distress may be more likely to engage in risky behaviors when experiencing intense emotions.

Results of the present study also highlight the utility of these EM and IR skills training modules as experimental manipulations. Specifically, and consistent with expectations, one week post-manipulation, individuals in the EM condition reported significant decreases in overall emotion dysregulation (as well as all specific dimensions of emotion dysregulation other than emotional nonacceptance), as well as the related UPPS-P dimensions of negative and positive urgency. Conversely, individuals in the IR condition reported a significant decrease in (lack of) premeditation one week post-manipulation. Importantly, results suggest that EM and IR manipulations successfully targeted specific, non-overlapping constructs.

Although the results of the present study add to the growing body of literature on the mechanisms underlying risky behaviors, several limitations must be considered. First, this study represents the first step in identifying potential mechanisms that may underlie risky behaviors in African American women; consequently, this study involved a small, homogeneous, nonclinical sample of participants, limiting both our statistical power and the statistical conclusion validity and generalizability of our findings. As such, non-significant findings should be interpreted with caution. Furthermore, replication of these findings in larger, more diverse samples of African American women in community and clinical settings is needed. Likewise, whereas the focus on risky behaviors among African American women may be considered a strength of this study, future studies would benefit from examination of these mechanisms in populations with heightened rates of emotion dysregulation and impulsivity, such as substance dependent patients (e.g., Fox, Axelrod, Paliwal, Sleeper, & Sinha, 2007; Fox, Hong, & Sinha, 2008).

In addition, although a growing body of theoretical and empirical literature suggests that emotion dysregulation may underlie risky behaviors (Tull et al., 2012; Weiss et al., 2012), it is also possible that this association is bidirectional, with regular involvement in risky behaviors leading to or exacerbating emotion dysregulation. Larger-scale prospective investigations may improve our understanding of the interrelations of risky behaviors and emotion dysregulation over time. Studies utilizing experience sampling methods may provide further evidence of the emotion-regulating function of risky behaviors.

An additional limitation is the exclusive reliance on a self-report measure of emotion dysregulation, responses to which may be influenced by an individual's willingness and/or ability to report accurately on emotional responses. However, it is important to note that the measure of emotion dysregulation utilized in this study is strongly correlated with objective measures of emotion regulation (see Gratz et al., 2006; Gratz & Tull, 2010b). Nonetheless, future studies would benefit from multimodal assessment of emotion dysregulation. Similarly, risky behaviors were assessed through a self-report questionnaire, which may be limited by participants' willingness or ability to report on these behaviors. However, there is evidence that self-report measures may provide more accurate reports of risky behaviors (e.g., risky sexual behavior) than other assessment methods (Fenton, Johnson, McManus, & Erens, 2001; Johnson et al., 2000). Nonetheless, future studies would benefit from the inclusion of other methods of assessing risky behaviors, such as timeline follow-back procedures (Weinhardt, Carey, & Carey, 2000).

Despite these limitations, results of the present study add to the literature on the role of emotion dysregulation and impulsivity in risky behaviors, providing preliminary experimental evidence for the effect of emotion dysregulation on risky behaviors. As such, the findings from this study highlight the potential utility of targeting emotion dysregulation in interventions aimed at reducing risky behaviors. Although treatments that include emotion regulation skills training have been found to reduce risky behaviors (e.g., ERGT and Dialectical Behavior Therapy; Gratz & Tull, 2011 and Linehan, 1993, respectively), few studies have examined the effects of these treatments outside the context of borderline personality pathology. Future investigations are needed to examine the utility of these treatments in reducing risky behaviors within other populations.

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References

- Arnett J. Reckless behavior in adolescence: A developmental perspective. *Developmental Review*. 1992; 12:339–373.
- Bachman, JG., Johnston, LD., O'Malley, PM., Schulenberg, JE. Transitions in alcohol and other drug use and abuse during late adolescence and young adulthood. In: Graber, J.Brooks-Gunn, J., Petersen, AC., editors. *Transitions through adolescence: Interpersonal domains and contexts*. Mahwah, NJ: Lawrence Erlbaum Associates; 1996. p. 111-140.
- Bender TW, Gordon KH, Bresin K, Joiner TE. Impulsivity and suicidality: The mediating role of painful and provocative experiences. *Journal of Affective Disorders*. 2010; 129:301–307. [PubMed: 20719393]
- Bonn-Miller MO, Vujanovic AA, Zvolensky MJ. Emotional dysregulation: Association with coping-oriented marijuana use motives among current marijuana users. *Substance Use and Misuse*. 2008; 43:1656–1668.
- Coffey SC, Stasiewicz PR, Hughes PM, Brimo ML. Trauma-focused imaginal exposure for individuals with comorbid posttraumatic stress disorder and alcohol dependence: Revealing mechanisms of alcohol craving in a cue reactivity paradigm. *Psychology of Addictive Behaviors*. 2006; 20:425–435. [PubMed: 17176177]
- Cyders MA, Flory K, Rainer S, Smith GT. The role of personality dispositions to risky behavior in predicting first-year college drinking. *Addiction*. 2009; 104:193–202. [PubMed: 19149813]
- Cyders MA, Smith GT. Mood-based rash action and its components: Positive and negative urgency. *Personality and Individual Differences*. 2007; 43:839–850.
- Cyders MA, Smith GT. Clarifying the role of personality dispositions in risk for increased gambling behavior. *Personality and Individual Differences*. 2008a; 45:503–508. [PubMed: 19088857]
- Cyders MA, Smith GT. Emotion-based dispositions to rash action: The trait of urgency. *Psychological Bulletin*. 2008b; 134:807–828. [PubMed: 18954158]
- Cyders MA, Smith GT, Spillane NS, Fischer S, Annun AM, Peterson C. Integration of impulsivity and positive mood to predict risky behavior: Development and validation of a measure of positive urgency. *Psychological Assessment*. 2007; 19:107–118. [PubMed: 17371126]
- Dariotis JK, Sifakis F, Pleck JH, Astone NM, Sonenstein FL. Racial and ethnic disparities in sexual risk behaviors and STDs during young men's transition to adulthood. *Perspectives on Sexual and Reproductive Health*. 2011; 43:51–59. [PubMed: 21388505]
- Donohew L, Zimmerman R, Cupp PS, Novak S, Colon S, Abell R. Sensation seeking, impulsive decision making, and risky sex: Implications for risk-taking and design of interventions. *Personality and Individual Differences*. 2000; 28:1079–1091.
- Evenden JL. Varieties of impulsivity. *Psychopharmacology*. 1999; 146:348–361. [PubMed: 10550486]
- Eysenck SB, Eysenck HJ. The place of impulsiveness in a dimensional system of personality description. *British Journal of Social & Clinical Psychology*. 1977; 16:57–68. [PubMed: 843784]
- Fenton KA, Johnson AM, McManus S, Erens B. Measuring sexual behavior: Methodological challenges in survey research. *Sexually Transmitted Infections*. 2001; 77:84–92. [PubMed: 11287683]
- Fischer, S., Smith, GT., Spillane, N., Cyders, MA. Urgency: Individual differences in reaction to mood and implications for addictive behaviors. In: Clark, AV., editor. *The psychology of mood*. New York, New York: Nova Science Publishers; 2005. p. 85-107.
- Fox HC, Axelrod SR, Paliwal PP, Sleeper JJ, Sinha RR. Difficulties in emotion regulation and impulse control during cocaine abstinence. *Drug and Alcohol Dependence*. 2007; 89:298–301. [PubMed: 17276626]

- Fox HC, Hong KA, Sinha RR. Difficulties in emotion regulation and impulse control in recently abstinent alcoholics compared with social drinkers. *Addictive Behaviors*. 2008; 33:388–394. [PubMed: 18023295]
- Gratz KL, Bornova MA, Delany-Brumsey A, Nick B, Lejuez CW. A laboratory-based study of the relationship between childhood abuse and experiential avoidance among inner-city substance users: The role of emotional non-acceptance. *Behavior Therapy*. 2007; 38:256–268. [PubMed: 17697851]
- Gratz KL, Gunderson JG. Preliminary data on an acceptance-based emotion regulation group intervention for deliberate self-harm among women with borderline personality disorder. *Behavior Therapy*. 2006; 37:25–35. [PubMed: 16942958]
- Gratz KL, Paulson A, Jakupcak M, Tull MT. Exploring gender differences in the relationship between childhood maltreatment and intimate partner abuse: The mediating role of emotion dysregulation. *Violence and Victims*. 2009; 24:68–82. [PubMed: 19297886]
- Gratz KL, Roemer L. Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *Journal of Psychopathology and Behavioral Assessment*. 2004; 26:41–54.
- Gratz KL, Roemer L. The relationship between emotion dysregulation and deliberate self-harm among female undergraduate students at an urban commuter university. *Cognitive Behaviour Therapy*. 2008; 37:14–25. [PubMed: 18365795]
- Gratz KL, Rosenthal MZ, Tull MT, Lejuez CW, Gunderson JG. An experimental investigation of emotion dysregulation in borderline personality disorder. *Journal of Abnormal Psychology*. 2006; 115:850–855. [PubMed: 17100543]
- Gratz KL, Tull MT. The relationship between emotion dysregulation and deliberate self-harm among inpatient substance users. *Cognitive Therapy and Research*. 2010a; 34:544–553. [PubMed: 21132101]
- Gratz, KL., Tull, MT. Emotion regulation as a mechanism of change in acceptance-and mindfulness-based treatments. In: Baer, RA., editor. *Assessing mindfulness and acceptance: Illuminating the processes of change*. Oakland, CA: New Harbinger Publications; 2010b. p. 107-134.
- Gratz KL, Tull MT. Extending research on the utility of an adjunctive emotion regulation group therapy for deliberate self-harm among women with borderline personality pathology. *Personality Disorders: Theory, Research, and Treatment*. 2011; 2:316–326.
- Heatherton TE, Baumeister RF. Binge eating as an escape from self-awareness. *Psychological Bulletin*. 1991; 110:86–108. [PubMed: 1891520]
- Johnson ME, Fisher DG, Montoya I, Booth R, Rhodes F, Andersen M, ... Williams M. Reliability and validity of not-in-treatment drug users' follow-up self-reports. *AIDS and Behavior*. 2000; 4:373–380.
- Lejuez CW, Aklin WM, Jones HA, Richards JB, Strong DR, Kahler CW, Read JP. The Balloon Analogue Risk Task (BART) differentiates smokers and nonsmokers. *Experimental and Clinical Psychopharmacology*. 2003; 11:26–33. [PubMed: 12622341]
- Linehan, MM. *Cognitive Behavioral Treatment of Borderline Personality Disorder*. New York: Guilford Press; 1993.
- Messman-Moore TL, Walsh K, DiLillo D. Emotion dysregulation and risky sexual behavior in revictimization. *Child Abuse & Neglect*. 2010; 34:967–976. [PubMed: 21030084]
- Mulia N, Ye Y, Greenfield TK, Zemore SE. Disparities in alcohol-related problems among White, Black, and Hispanic Americans. *Alcoholism: Clinical and Experimental Research*. 2009; 33:654–662.
- Peñas-Lledó E, Waller G. Bulimic psychopathology and impulsive behaviors among nonclinical women. *International Journal of Eating Disorders*. 2001; 29:71–75. [PubMed: 11135336]
- Perry J, Carroll M. The role of impulsive behavior in drug abuse. *Psychopharmacology*. 2008; 200:1–26. [PubMed: 18600315]
- Rosotto, E., Yager, J., Rorty, M. The Impulsive Behavior Scale. In: Vanderlinden, J., Vandereycken, W., editors. *Trauma, dissociation, and impulse dyscontrol in eating disorders*. Philadelphia, PA: Brunner/Mazel; 1998.

- Ryb GE, Dischinger PC, Kufera JA, Read KM. Risk perception and impulsivity: Association with risky behaviors and substance abuse disorders. *Accident Analysis and Prevention*. 2006; 38:567–573. [PubMed: 16426559]
- Tucker LR, Damarin F, Messick SA. A base-free measure of change. *Psychometrika*. 1966; 31:457–473. [PubMed: 5232435]
- Tull MT, Gratz KL, Latzman RD, Kimbrel N, Lejuez CW. Reinforcement sensitivity theory and emotion regulation difficulties: A multimodal investigation. *Personality and Individual Differences*. 2010; 49:989–994.
- Tull MT, Weiss NH, Adams CE, Gratz KL. The contribution of emotion regulation difficulties to risky sexual behavior within a sample of patients in residential substance abuse treatment. *Addictive Behaviors*. 2012; 37:1084–1092. [PubMed: 22658304]
- Vasilev CA, Crowell SE, Beauchaine TP, Mead HK, Gatzke-Kopp LM. Correspondence between physiological and self-report measures of emotion dysregulation: A longitudinal investigation of youth with and without psychopathology. *Journal of Child Psychology and Psychiatry*. 2009; 50:1357–1364. [PubMed: 19811585]
- Webster, CD., Jackson, MA. *Impulsivity: Theory, assessment, and treatment*. New York: Guilford; 1997.
- Wechsler H, Davenport A, Dowdall G, Moeykens B, Castillo S. Health and behavioral consequences of binge drinking in college: A national survey of students at 140 colleges. *Journal of the American Medical Association*. 1994; 272:1672–1677. [PubMed: 7966895]
- Weinhardt LS, Carey KB, Carey MP. HIV-risk sensitization following a detailed sexual behavior interview: A preliminary investigation. *Journal of Behavioral Medicine*. 2000; 23:393–398. [PubMed: 10984867]
- Weiss NH, Tull MT, Anestis MD, Gratz KL. The relative and unique contributions of emotion dysregulation and impulsivity to posttraumatic stress disorder among substance dependent inpatients. *Drug and Alcohol Dependence*. 2013; 128:45–51. [PubMed: 22917752]
- Weiss NH, Tull MT, Viana AG, Anestis MD, Gratz KL. Impulsive behaviors as an emotion regulation strategy: Associations between PTSD, emotion dysregulation, and impulsive behaviors among substance dependent inpatients. *Journal of Anxiety Disorders*. 2012; 26:453–458. [PubMed: 22366447]
- Whiteside U, Chen E, Neighbors C, Hunter D, Lo T, Larimer M. Difficulties regulating emotions: Do binge eaters have fewer strategies to modulate and tolerate negative affect? *Eating Behaviors*. 2007; 8:162–169. [PubMed: 17336786]
- Whiteside SP, Lynam DR. The five factor model and impulsivity: Using a structural model of personality to understand impulsivity. *Personality and Individual Differences*. 2001; 30:669–689.
- Whiteside SP, Lynam DR. Understanding the role of impulsivity and externalizing psychopathology in alcohol abuse: Application of the UPPS Impulsive Behavior Scale. *Experimental and Clinical Psychopharmacology*. 2003; 11:210–217. [PubMed: 12940500]
- Whiteside SP, Lynam DR, Miller JD, Reynolds SK. Validation of the UPPS Impulsive Behavior Scale: A four-factor model of impulsivity. *European Journal of Personality*. 2005; 19:559–574.
- Zapolski TCB, Cyders MA, Smith GT. Positive urgency predicts illegal drug use and risky sexual behavior. *Psychology of Addictive Behaviors*. 2009; 23:348–354. [PubMed: 19586152]
- Zuckerman M. Sensation seeking: A comparative approach to a human trait. *Behavioural and Brain Sciences*. 1984; 7:413–471.

Table 1

Content of the one-hour emotion modulation and impulsivity reduction manipulations

Emotion Modulation (EM)	<ul style="list-style-type: none"> • Discussion of the paradoxical effects of emotional avoidance • Introduction of emotional approach and distraction as adaptive emotion regulation strategies • Psychoeducation on the contextually-dependent nature of adaptive emotion regulation • Identification of approach and distraction strategies to replace avoidant emotion regulation strategies, as well as contexts best suited for each strategy
Impulsivity Reduction (IR)	<ul style="list-style-type: none"> • Identification of impulsive behaviors utilized by the participants, as well as the negative consequences associated with these behaviors • Discussion of the short-lived nature of urges • Introduction of four strategies for reducing behavioral urges: distraction/delay, behavioral substitution, pros and cons, and consequence modification

Intercorrelations and descriptive data for the DERS, UPPS, and IBS at pre- and post-manipulation

Table 2

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. DERS Total	--	.79***	.76***	.91***	.90***	.73***	.68***	.33	.68***	.33	.24	.55**	.52**
2. DERS ACCEPT	.83***	--	.37	.78***	.66***	.53**	.42*	.17	.43*	.34	.02	.38	.50*
3. DERS GOALS	.75***	.40	--	.68***	.79***	.36	.41*	.22	.67***	.12	.27	.28	.25
4. DERS IMPULSE	.91***	.86***	.55**	--	.92***	.55**	.37	.17	.62**	.27	.15	.58**	.47*
5. DERS STRATEGY	.80***	.58**	.75***	.79***	--	.40	.44*	.13	.70***	.20	.32	.48*	.50*
6. DERS AWARE	.73***	.54**	.41	.52*	.26	--	.71***	.52**	.36	.38	.19	.57**	.34
7. DERS CLARITY	.89***	.74***	.54*	.77***	.53*	.80***	--	.42*	.43*	.29	.20	.31	.43*
8. UPPS SS	.52*	.40	.56**	.33	.22	.52*	.53*	--	.20	-.02	-.06	.40	.11
9. UPPS NU	.63**	.47*	.70***	.47*	.53*	.46*	.44*	.58**	--	.05	.52**	.54**	.23
10. UPPS PREMED	.46*	.34	.30	.47*	.27	.50*	.34	.19	.61**	--	-.06	.26	.54**
11. UPPS PERS	.38	.03	.55**	.22	.32	.41	.28	.20	.57**	.70***	--	.37	.01
12. UPPS PU	.62**	.32	.65**	.59**	.49*	.45*	.56**	.58**	.64**	.64**	.59**	--	.31
13. IBS	.62**	.66**	.34	.62**	.58**	.39	.43	.36	.50*	.16	.03	.31	--
Mean Pre	75.48	11.39	13.22	10.70	14.91	14.13	11.13	41.74	34.23	20.57	19.09	36.83	4.75
SD Pre	29.72	6.34	5.92	5.68	7.85	6.28	5.00	8.32	6.16	5.22	5.61	6.41	6.60
Mean Post	60.80	10.05	9.80	8.05	12.20	11.95	8.75	40.35	31.53	16.56	18.85	33.85	1.08
SD Post	23.33	1.65	4.53	3.56	6.03	5.70	4.35	9.91	4.81	5.31	5.10	3.94	1.47

Note. DERS=Difficulties in Emotion Regulation Scale; DERS ACCEPT=DERS Emotional Nonacceptance Subscale; DERS GOALS=DERS Difficulties Engaging in Goal-Directed Behavior When Distressed Subscale; DERS IMPULSE=DERS Difficulties Controlling Impulsive Behaviors When Distressed Subscale; DERS STRATEGY=DERS Lack of Effective Emotion Regulation Strategies Subscale; DERS AWARE=DERS Lack of Emotional Awareness Subscale; DERS CLARITY=DERS Lack of Emotional Clarity Subscale; UPPS-P = UPPS-P Impulsive Behavior Scale; UPPS SS=UPPS-P Sensation Seeking Subscale; UPPS NU=UPPS-P Negative Urgency Subscale; UPPS PREMED=UPPS-P (lack of) Premeditation Subscale; UPPS PERS=UPPS-P (lack of) Perseverance Subscale; UPPS PU=UPPS-P Positive Urgency Subscale; IBS=Impulsive Behavior Scale. Correlations at pre-assessment appear above the diagonal and correlations at post-assessment appear below the diagonal.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 3

Means, standard deviations, repeated measures analyses of variance, and post-hoc paired sample *t*-tests exploring changes in emotion dysregulation and impulsivity dimensions over time

	Emotion Modulation (<i>n</i> = 10)		Impulsivity Reduction (<i>n</i> = 10)		<i>t</i>	Effect of Time F_{η^2}	Time × Condition F_{η^2}
	Pre- <i>M</i> (SD)	Post- <i>M</i> (SD)	Pre- <i>M</i> (SD)	Post- <i>M</i> (SD)			
DERS							
Overall	83.70 (37.00)	56.10 (21.02)	68.80 (23.01)	65.60 (25.59)	.24	8.72**	5.47*
						.33	.23
ACCEPT	12.50 (7.60)	9.70 (3.71)	10.40 (5.06)	10.40 (5.62)	-.80	1.79	1.79
						.09	.09
GOALS	15.10 (4.79)	9.70 (4.06)	11.00 (5.87)	9.90 (5.17)	.97	10.82**	4.74*
						.38	.21
IMPULSE	11.50 (7.38)	7.70 (3.68)	8.90 (3.54)	8.50 (3.50)	.23	5.71*	3.74
						.24	.17
STRATEGY	16.60 (9.79)	11.20 (4.85)	14.40 (6.91)	13.20 (7.15)	.28	5.49*	1.22
						.23	.11
AWARENESS	15.10 (6.05)	10.30 (4.42)	13.20 (7.07)	13.60 (6.55)	-.94	7.20**	10.06*
						.29	.36
CLARITY	12.90 (4.61)	7.50 (3.06)	10.90 (5.28)	10.00 (5.21)	.62	9.22**	4.71*
						.34	.21
UPPS-P							
SS	42.50 (7.62)	39.90 (9.96)	41.30 (10.11)	40.80 (10.37)	.60	.71	.33
						.04	.02
PERS	21.21 (4.13)	19.40 (5.56)	18.30 (6.86)	18.30 (4.83)	.00	1.30	1.30
						.07	.07
PREMED	18.80 (4.94)	17.32 (6.06)	22.50 (5.25)	15.79 (3.84)	4.32**	10.50**	4.28*
						.37	.19
NU	37.30 (4.81)	31.60 (5.27)	31.04 (4.81)	31.46 (4.57)	-.35	6.84*	9.28**
						.28	.34
PU	38.70 (8.58)	33.80 (4.34)	34.70 (4.08)	33.90 (3.73)	.56	5.87*	3.04
						.25	.14

Note. DERS = Difficulties in Emotion Regulation Scale (Gratz & Roemer, 2004); ACCEPT = Nonacceptance of negative emotions; GOALS = Difficulties engaging in goal-directed behaviors when distressed; IMPULSE = Difficulties controlling impulsive behaviors when distressed; STRATEGY = Limited access to emotion regulation strategies perceived as effective; AWARENESS = Lack of emotional awareness; CLARITY = Lack of emotional clarity; UPPS-P = UPPS-P Impulsive Behavior Scale; SS = Sensation seeking; PERS = Lack of perseverance; PREMED = Lack of premeditation; NU = Negative urgency; PU = Positive urgency.

.100
p

.10
p
**
.50
p
*

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Table 4

Hierarchical regression analysis examining the unique contributions of changes in overall emotion dysregulation, negative urgency, positive urgency, and (lack of) premeditation in changes in risky behaviors over time

	β	t	R^2	F
Step One			.11	.66
Negative Urgency	.16	.63		
Positive Urgency	-.16	-.65		
(Lack of) Premeditation	.30	1.22		
Step Two			.44	2.93
Negative Urgency	-.46	-1.58		
Positive Urgency	.14	.62		
(Lack of) Premeditation	.25	1.23		
Overall DERS	.94	2.96**		

Note.

**
 p .01.