Negative urgency is correlated with the use of reflexive and disengagement emotion regulation strategies

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Abstract

Negative urgency predicts both internalizing and externalizing psychopathology. Although it is hypothesized that urgency is characterized by reflexive responses to negative emotion that focus on immediate relief from distress, little research has addressed this hypothesis. Using data from four independent samples of adolescents and college students ($n=1,268$), we estimated the association between trait negative urgency and emotion regulation strategies that reflect either reflexive responses or disengagement. We verified these effects in two samples ecological momentary assessments (EMA) ($n=198$). In retrospective data, negative urgency was correlated with using more disengagement or reflexive emotion regulation strategies relative to engagement strategies ($r=.39; .38$, 95% CI =0.30–0.49; 0.18–0.57). This finding replicated in EMA data ($r=.24$, 95% CI =0.11–0.38). Emotion regulation may be a key mechanism of the effects of urgency on psychopathology. Interventions targeting emotion regulation among those high on urgency may be warranted.

Self-regulated behavior is hypothesized to emerge from an appropriate balance between reflexive, automatic responses to stimuli, and more controlled, effortful processes (Carver, Johnson, & Joormann, 2008, 2009). Dyscontrolled behavior, on the other hand, is thought to arise when reflexive responses to stimuli overwhelm effortful attempts at redirecting or controlling those responses. Negative urgency is a personality disposition reflecting rash action in response to strong negative emotions (Cyders & Smith, 2008). Indeed, there is substantial evidence that negative urgency is associated with risk for externalizing disorders that are characterized by rash action, such as alcohol and drug problems (Berg, Latzman, Bliwise, & Lilienfeld, 2015; Coskunpinar, Dir, & Cyders, 2013; Smith et al., 2007), binge eating symptoms (Fischer, Smith, & Cyders, 2008), and self-injury and borderline symptoms (Berg et al., 2015).

Carver and others have argued that reflexive responses to emotions represent a core vulnerability to psychopathology (the “P” factor) (Carver, Johnson, & Timpano, 2017; Johnson, Carver, & Joormann, 2013). Smith and Cyders (2016) hypothesized that negative urgency itself represents individual differences in the tendency towards reflexive responses to emotions (Carver et al., 2008; Smith & Cyders, 2016). This is supported by recent research indicating that negative urgency is associated with symptoms of internalizing disorders such as anxiety and depression (Smith, Guller, & Zapolski, 2013). A meta-analysis reported associations between negative urgency and both depressive ($r = .45$) and anxiety ($r = .40$) symptoms (Berg et al., 2015), even stronger than association between urgency and most other externalizing behaviors (Berg et al., 2015; Coskunpinar et al., 2013; Stautz & Cooper, 2013). In the face of strong negative emotions, individuals high on negative urgency are hypothesized to be biased towards reflexive action (i.e. rash/impulsive action), leading to externalizing behaviors, *or* reflexive inaction (such as avoidant behaviors), leading to internalizing symptoms. Carver has emphasized

that reflexive responses to emotions may include cognitions as well as behaviors (Carver et al., 2017). In the current study, we tested this hypothesis by examining the association of negative urgency with emotion regulation behaviors, which can encompass reflexive cognitive and avoidant behavioral responses to emotion.

Emotion Regulation and Negative Urgency

One way to understand individuals' differences in responses to negative emotions is to examine their typical emotion regulation behaviors. Emotion regulation broadly refers to how individuals identify, evaluate and attempt to modify their emotions, which can arise in response to stress, but also to internal stimuli or other stimuli not perceived as stressful (Sheppes, Suri, & Gross, 2015). Coping, on the other hand, refers specifically to individuals' responses to stress (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001). There is much commonality across the two constructs, in that they can refer to efforts to modify thoughts or situations in order to alter the impact of a stressor or strong emotion (Compas et al., 2017). For the current study, we use emotion regulation as a more general term, although the literature we review and the measures we use capture both emotion regulation broadly, as well as coping with stress specifically. For the current study, we focused on what Compas and colleagues called *strategies*, or the approaches that individuals can take to regulate their emotions. Engagement strategies that attempt to alter the source of an emotional response (problem solving) or the response itself (reappraisal or acceptance) may take longer to alter emotions, but be more effective in the long-term (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Sheppes et al., 2015).

Other emotion regulation strategies reflect disengaging from or avoiding distress, focusing on more immediate affect relief in spite of the long-term consequences. Efforts to deny, suppress or avoid a stressor or emotion may produce rapid, but short-term decreases in negative

emotions (Compas et al., 2001; Gross, 2002), reinforcing those emotion regulation strategies despite their long-term ineffectiveness. Because individuals high on negative urgency are thought to favor immediate solutions to negative emotions despite the potential long-term consequences, we hypothesize that they will be relatively more likely to report the use of disengagement strategies (i.e. denial, avoidance, or suppression), and less likely to report using engagement strategies (i.e. problem solving, reappraisal, or acceptance).

Other emotion regulation strategies may represent reflexive responses to strong emotions that have little to do with reducing distress. Although most emotion regulation strategies are considered to be controlled processes because they are used purposefully and consciously to regulate emotions, a few are considered to be reflexive responses to negative emotions (such as catastrophizing or self-blaming) or a mixture of both reflexive and controlled processes, such as rumination (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Because negative urgency is hypothesized to represent reflexivity in the face of negative emotions, we hypothesized that individuals high on negative urgency would also be characterized by a higher use of reflexive emotion regulation responses (catastrophizing, self-blaming and rumination).

Using more disengagement or reflexive emotion regulation strategies, and fewer engagement strategies, has been associated with risk for psychopathology. A meta-analysis showed that acceptance, problem solving and reappraisal were negatively associated with symptoms of anxiety and depression, while avoidance, rumination and suppression were positively associated with anxiety, depression, substance and eating problems (Aldao et al., 2010). Given that negative urgency is also correlated with similar forms of psychopathology, it may be that negative urgency is characterized by the use of more reflexive or disengagement emotion regulation strategies, relative to engagement.

Personality correlates of emotion regulation. Although no research has directly studied which emotion regulation strategies are associated with urgency, other research has suggested that personality traits are associated with using specific emotion regulation strategies. This is thought to be explained through shared biological and cognitive processes that underlie both stable patterns of behavior (Carver & Connor-Smith, 2010), and dynamically, through the many ways personality can influence stress exposure, appraisal, and expectancies of emotion regulation behaviors (Grant & Langan-Fox, 2006; Vollrath & Torgersen, 2000). Negative urgency was derived from the impulsiveness facet of neuroticism (Whiteside & Lynam, 2001), and has shown close overlap with measures of negative emotionality and affect-free impulsiveness (Sharma, Markon, & Clark, 2014). It has also been shown to share variance with (dis)agreeableness and low conscientiousness, although it is distinct from them (Cyders & Smith, 2008; Settles et al., 2012). A meta-analysis of 86 studies reported that neuroticism, from which negative urgency was derived, was moderately correlated with specific emotion regulation strategies reflecting either disengagement, such as denial and withdrawal, or reflexive responses, such as rumination. Conscientiousness was associated with less denial and more problem solving and cognitive restructuring, and agreeableness was associated with less denial and more cognitive restructuring (Connor-Smith & Flachsbart, 2007). Although this provides initial support for our hypothesis, negative urgency is distinct from neuroticism because it reflects emotion-driven impulsivity rather than broad-band negative emotionality (Cyders & Coskunpinar, 2010), and it is important to understand whether these associations are specific to urgency.

Ecological momentary assessment (EMA) of emotion regulation. There also may be differences between what individuals report as their typical style of emotion regulation and what

they actually do they do when experiencing negative emotions. Several studies reported poor convergence across measures of trait emotion regulation and real-time assessments of emotion regulation (Schwartz, Neale, Marco, Shiffman, & Stone, 1999; Stone et al., 1998). This may be influenced by personality related biases that impede individuals' ability to accurately recall their own behaviors. Neuroticism, for example, is associated with negative biases in recall and encoding, suggesting that individuals high on negative urgency may also be prone to over-remember and thus over-report negative events, biasing their report of emotion regulation (Eysenck & Mogg, 1992; Ruiz-Caballero & Bermúdez, 1995). A prior meta-analysis reported that neuroticism was unrelated to retrospectively reported engagement regulation strategies, but was positively associated with daily reports of those same strategies (Connor-Smith & Flachsbart, 2007). There were no studies with daily or EMA data on the use of disengagement or reflexive strategies. Thus, for the current study, we included data from two EMA studies of adolescents and young adults to test whether those high on negative urgency also reported higher use of disengagement or reflexive emotion regulation strategies in their daily lives.

The Current Study

The main goal of the current study was to estimate the association between self-reported negative urgency and the use of specific emotion regulation strategies. The data we use are from a variety of samples assessed with different sampling approaches (community recruitment vs. convenience samples) and different age ranges (adolescents and colleges students). Thus, to increase our statistical power and provide more precise estimates of effect size we used mini-meta analysis (Goh et al., 2016) to pool estimates across samples.

Methods

Participants

Table 1 presents demographic and study information for all five samples. Samples 1, 3 and 4 are archival data, and represent all samples our lab has obtained with measures of both negative urgency and emotion regulation. We have not reported any findings on negative urgency or emotion regulation with these samples previously. Samples 2 and 5 (those with EMA data) are new data collections.

Sample 1. Data were collected from a multi-site community sample of adolescents ages 16 and 18 ($n = 287$) from three major cities in the United States (Boston, MA; Seattle, WA; and Pittsburgh, PA). Participants were recruited from the general community using advertisements in public transportation and other public places, Craigslist, and community centers. The majority of the sample was in the 10th grade (with 91.3% in 10th, 11th and 12th grades, 5.9% in 9th grade or graduated, and the remaining 2.8% declining to report grade). The current study used data from the baseline session of a multi-visit data collection, and only included participants who had complete data on emotion regulation and negative urgency measures ($n = 281$); the 6 participants with missing data did not differ on any demographic characteristics from those included in the current study. Participants were paid \$30 for participation.

Sample 2. Participants ($n = 159$) were undergraduate students with an internet enabled smartphone at a university in the Pacific Northwest who received course credit for survey participation. Participants completed an in-lab baseline survey assessing their personality, emotion regulation and other behaviors. For analysis of trait data, we included participants who had complete data on emotion regulation and negative urgency measures ($n = 154$); the 5 participants with missing data did not differ on any demographic characteristics from those included in the current study.

Following the in-lab baseline, participants were trained on an ecological momentary assessment protocol. Starting on a Friday, participants received 3 text messages per day (at random times during the morning, mid-day and evening) with a link to a brief web-based survey, for 10 days. Participants received surveys at least 2 hours apart and had two hours to complete each survey with 1 text message reminder for each survey. Only 5 participants (3.5%) completed fewer than 50% of EMAs; the response rate among those completing more than 50% of EMAs was 88.2%. To increase the reliability of the EMA data, we only included data from participants (EMA $n = 147$) who completed at least 3 full days of data collection (i.e. ≥ 9 total EMAs) in the final analysis. Eight excluded participants completed the baseline but declined the EMA portion of the study or had missing data on negative urgency, while four participants completed only 1-3 EMAs. There were no differences between included and excluded participants on the baseline data. We obtained a total of 4,808 EMA observations from these participants

Sample 3. Participants ($n = 396$) were undergraduate students at a university in the Pacific Northwest who received course credit for survey participation. We excluded participants who did not have complete data on emotion regulation and negative urgency ($n = 12$; 3% of the current sample). Excluded participants did not differ from those included on any demographic measures. Participants completed the study in a single online assessment during 2012-2013.

Sample 4. Participants ($n = 491$) were undergraduate students at a university in the Pacific Northwest who received course credit for survey participation; we excluded participants who did not have complete data on emotion regulation and negative urgency ($n = 42$; 8.5% of the current sample). Excluded participants did not differ from those included on any demographic measures. Participants completed the study in a single online assessment during 2010-2011.

Sample 5. Participants ($n = 60$) were high school students at a single high school in the Pacific Northwest who agreed to participate in an ecological momentary assessment study as part of a larger examination of a school-wide intervention. Following a baseline assessment online and telephone training session with a research assistant, participants completed the same EMA protocol described for Sample 2. Participants were paid \$1 per EMA and \$5 for the baseline survey. Only 6 (10%) participants completed fewer than 50% of EMAs; the response rate among those completing more than 50% of EMAs was 77.3%. We again included data from participants who completed at least 3 full days of data collection (i.e. ≥ 9 total EMAs) in the final analysis ($n = 51$); excluded participants completed between 0 and 9 EMAs. There were no differences between included and excluded participants on the baseline data. We obtained a total of 1,803 EMA observations from these participants.

Measures

Trait Negative Urgency. We measured trait negative urgency in all five studies with the negative urgency subscale (12 total items) of the Urgency Premeditation Perseverance Sensation Seeking (UPPS) scale (Whiteside & Lynam, 2001). Sample items included “I often act without thinking when I am upset” and “I have trouble controlling my impulses”. Participants responded on a 4-point Likert scale from 1 = *Agree Strongly* to 4 = *Disagree Strongly* (items were coded so that high values indicated high urgency). Alphas were high across all four samples ($\alpha > .85$).

Trait Emotion Regulation. Because individuals exposed to more stress or negative emotions report higher levels of all forms of emotion regulation (Compas et al., 2017), and we were interested in the *relative* level of the use of disengagement or reflective relative to engagement strategies, we computed a ratio of the mean of all disengagement or reflexive strategies relative to the mean of all engagement strategies as the main outcome. We also

examined the association of urgency with each specific strategy. Specific measures of emotion regulation for each sample are reported below.

Samples 1 and 2. We measured emotion regulation using 36 items from the Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski & Kraaij, 2006), which measures what individuals generally think when experiencing negative or unpleasant events. Each sub-scale was measured with 4 items each, with response options ranging from 1 = *Almost never* to 5 = *Almost always*. Emotion regulation strategies measured by the CERQ largely reflected reflexive responses, including *self-blame*, thoughts of putting the blame for what you have experienced on yourself, *other-blame*, putting the blame for what you have experienced on the environment or another person, *rumination*, thinking about the feelings and thoughts associated with the negative event, and *catastrophizing*, thoughts of explicitly emphasizing the terror of what you have experienced. Engagement strategies include *putting into perspective*, brushing aside the seriousness of the event/emphasizing the relativity when comparing it to other events, *positive refocusing*, thinking about joyful or positive issues instead of thinking about the actual event, *positive reappraisal*, creating a positive meaning to the event in terms of personal growth, *acceptance*, accepting what you have experienced and resigning yourself to what has happened, *refocus on planning*, thinking about what steps to take and how to handle the negative event. We computed a ratio of the mean of disengagement or reflexive strategies divided by the mean of engagement emotion regulation strategies.

Samples 3 and 4. Emotion regulation was measured using an abbreviated version of the COPE inventory (Carver, Scheier & Weintraub, 1989), which asked participants what they do or feel when they experience a stressful event. We used 24 items assessing 8 types of coping behaviors (3 items per type), with response options ranging from 1 = *"I usually don't do this at*

all” to 4 = “*I usually do this a lot*”. The COPE largely measured disengagement strategies (rather than reflexive responses) included *denial* (i.e. “I refuse to believe that it has happened”) and *distraction* (i.e. “I turn to work or other substitute activities to take my mind off things”). Engagement strategies included *active* (i.e. “I concentrate my efforts on doing something about it”), *planning* (i.e. “I make a plan of action”), *restraint* (“I force myself to wait for the right time to do something”), *positive reappraisal* (i.e. “I try to see it in a different light, to make it seem more positive”), *humor* (i.e. “I laugh about the situation”), and *acceptance* (i.e. “I get used to the idea that it happened”). Cronbach’s alpha reliabilities are listed in Table 2, although we caution that a) Alpha reliabilities are in part driven merely by the number of items, and b) emotion regulation strategies may better be thought of as a behavioral index rather than as a latent construct, and thus lower than typical reliabilities are not considered problematic (Sijtsma, 2009). Again, we computed a ratio of the mean of disengagement or reflexive divided by the mean of engagement emotion regulation strategies.

Ecological Momentary Assessment of Emotion Regulation. *Samples 2 and 5.* At each assessment, participants reported whether or not (1 = yes, 0 = no) they had engaged in any emotion regulation strategies during the assessment window (“since you woke up this morning”, “since 12pm today”, and “since 4pm today...”). We adapted single items from the Cognitive Emotion Regulation Questionnaire (described above) and added an item measuring suppression. Disengagement or reflexive strategies included *rumination* (“You were unable to stop thinking about how you were feeling - thoughts kept popping up in your mind.”), *distraction* (“You tried to keep your mind off of a problem by doing something else.”), *avoidance* (“You tried not to think about a problem or tried to forget all about it.”), or *suppression* (“You tried to control your emotions by not expressing them”). Engagement strategies included *reframing* (“You tried to

think of a problem in a different way so it didn't seem as bad.”), *acceptance* (“You decided to accept a situation or problem the way it is”), *problem solving* (“You did something to fix a problem or thought of a way to make things better.”).

At each observation, participants also reported the degree to which they had experienced four negative emotions (angry, irritable, unhappy, anxious) in the past few hours using a slider bar (range = 0 – 100). At each EMA, negative emotions were correlated $r = .42 - .65$. We were interested in the use of emotion regulation strategies in response to the occurrence of negative emotions, rather than the use of emotion regulation strategies in general. For example, a participant could endorse “You decided to accept a situation or problem the way it is” due to an ongoing situation or problem that was not causing negative emotions *at that moment*, or they could endorse that item in response to current negative emotions. Moreover, there were individual differences in the degree to which participants reported negative emotions during the study period. Thus, we computed a person-level average of the level of the strongest negative emotion reported at each assessment. For any assessment where the strongest negative emotion was less than their average level, we recoded all emotion regulation variables to missing. Thus, emotion regulation strategies in the EMA data reflect which strategies a participant reported using at assessments when they were feeling more angry, irritable, unhappy or anxious than what was typical for them (Sample 2 $n = 1,803$, 37% of all observations, Sample 5 $n = 708$, 38% of all observations).

We then aggregated all remaining reports of emotion regulation at the individual level, which reflected the % of assessments that each participant reported using that emotion regulation strategy. Finally, we computed a ratio score reflecting the proportion of the sum of disengagement or reflexive strategies (with a possible range of 0 to 4, which would mean

participants reported using all four strategies 100% of the time) to the sum of engagement strategies (with a possible range of 0 to 3). As above, we converted each of these to a ratio by dividing the proportion score for each strategy into the sum of all strategies. Some participants (Sample 2 $n = 3$, Sample 5 $n = 3$) reported not using any emotion regulation strategies at any time point; these participants' data were treated as missing. Other participants reported using *only* disengagement or reflexive strategies (Sample 2 $n = 2$, Sample 5 $n = 8$) or *only* engagement strategies (Sample 2 $n = 15$, Sample 5 $n = 6$). For the former, we recoded their ratio score to reflect the simple sum of disengagement or reflexive strategies (because division by zero was impossible). The score for the latter was 0, reflecting no use of disengagement or reflexive strategies.

Analytic approach

We used meta-analytic methods, which can be applied to small samples to integrate information across even a few studies (Goh, Hall, & Rosenthal, 2016). We used random effects meta-analysis to account for cross-sample variation in the effect size due to method or demographic differences across studies (Borenstein, Hedges, Higgins, & Rothstein, 2009), and used the restricted maximum likelihood estimator (REML) to estimate between study variances (Veroniki et al., 2016). This provided us with an estimate of the pooled correlation, which was computed as the weighted mean of all observed correlations (weighted by within and between study variance), and a confidence interval of this estimate. We conducted all analyses in R 3.4.1 (R Core Team, 2017) using the package *meta* (Schwarzer, 2007).

Results

Table 2 presents descriptive statistics and reliability estimates for all variables used in analyses. For retrospective report of emotion regulation (Samples 1 - 4), the majority of

participants had a ratio score of less than 1, meaning that they reported a higher frequency of engagement focused strategies relative to disengagement or reflexive ones. For EMA report of emotion regulation, there was a broader range of ratios.

Trait correlations

We estimated the pooled association between negative urgency and the relative use of emotion regulation strategies across samples that shared common measures. These effects are presented in Table 3. The correlations across samples and measures were remarkably consistent. Bivariate correlations pooled across Samples 1 and 2 indicated that those high on urgency reported a higher tendency to ruminate, catastrophize, or blame themselves or others, vs. acceptance, perspective taking, reappraising, or planning (*pooled* $r = .39$, 95% CI = 0.30 - 0.49). In Samples 3 and 4, urgency was associated with a tendency to use denial or distraction, relative to planning, active coping, restraint, reappraisal, acceptance, or humor (*pooled* $r = .38$, 95% CI = 0.18 – 0.57). In terms of specific associations, negative urgency was associated with a higher propensity towards all forms of disengagement or reflexive emotion regulation strategies ($r = .17$ - .45) and was unrelated to engagement strategies.

Ecological momentary assessment of emotion regulation.

We then estimated the pooled correlation between self-report of trait negative urgency and EMA reports of emotion regulation strategies in Samples 2 and 5. We present these associations in Table 4. In both samples, negative urgency was associated with a higher ratio of disengagement or reflexive emotion regulation strategies relative to engagement strategies (*pooled* $r = .27$, 95% CI = 0.10 – 0.38), meaning that a 1 SD increase in negative urgency was associated with a .27 SD higher ratio of rumination, distraction, avoidance or suppression in response to negative emotions vs. using reframing, acceptance, or problem solving. In terms of

the use of specific emotion regulation strategies, there was less agreement across samples. In both EMA samples, negative urgency was related to higher average rumination (*pooled* $r = 0.33$, 95% CI = (0.20 -0.47). In Sample 2, there were specific associations more in line with theory, such that negative urgency was associated with higher use of rumination, avoidance, distraction and suppression, but also with more reframing. Other than rumination, these associations were not replicated in Sample 5.

Post-hoc analyses: negative emotionality and positive urgency

The construct of negative urgency exhibits conceptual overlap with positive urgency (i.e. a tendency towards rash action in the face of positive affect), and the two are often moderately to highly correlated (Cyders & Smith, 2008). Negative urgency also shares variance with neuroticism, in part because it was derived from the impulsiveness facet of neuroticism (Cyders & Coskunpinar, 2010; Sharma et al., 2014). Thus, in post-hoc analyses, we examined whether positive urgency (measured in 3 samples) was associated with reflexive or disengagement emotion regulation strategies, and whether negative urgency was associated with emotion regulation while controlling for negative emotionality.

Positive urgency. We obtained data on positive urgency (using the 14 item positive urgency subscale of the UPPS-P) (Cyders et al., 2007) in several of the current samples (2,3, 4 and 5, all $\alpha > .80$) and repeated the above analyses *post-hoc*. These analyses should be considered exploratory. Across samples, positive and negative urgency were moderately to highly correlated ($r > .54$, $p < .001$). In the retrospective data, positive urgency exhibited correlations only with the ratio of disengagement vs. engagement strategies (Sample 3 $r = .28$, Sample 4 $r = .26$, both $p < .001$), but not with reflexive vs. engagement (Sample 2, $r = .10$, $p > .05$). In the EMA data, we observed no association between positive urgency and the ratio of

reflexive/disengagement to engagement strategies while participants were experiencing higher than average negative emotions (Sample 2 $r = -0.01$, $p > .05$).

Negative emotionality. In Samples 1, 2 and 5, we obtained data on negative emotionality using the Emotional Reactivity Scale, which is a 21 item instrument that measures the sensitivity, persistence and intensity of negative emotional experiences (all $\alpha > .80$), and has good evidence of convergent and discriminant validity (Nock, Wedig, Holmberg, & Hooley, 2008). ERS total scores were moderately to highly correlated with negative urgency (Sample 1 $r = .62$; Sample 2 $r = .62$; Sample 5 $r = .38$; all $p < .01$). To explore whether variance in negative urgency that was not shared with negative emotionality was associated with maladaptive emotion regulation, we conducted linear regressions, predicting the emotion regulation ratio from negative urgency and the ERS total score. In the cross-sectional data, negative urgency was not associated with emotion regulation in Sample 1 (Urgency $\beta = .12$, $p = .07$; Negative emotionality $\beta = .38$, $p < .001$) or Sample 2 (Urgency $\beta = .17$, $p = .06$; Negative emotionality $\beta = .37$, $p < .001$), although the parameter estimates were relatively similar across studies. In the EMA data for Sample 2, negative urgency ($\beta = .26$, $p = .009$) was associated with the ratio of reflexive/disengagement to engagement emotion regulation controlling for emotionality ($b = -.006$, $p = .89$). This did not replicate for Sample 5, where negative urgency was not associated with emotion regulation regardless of whether ($\beta = -.05$, $p = .74$) or not ($\beta = .04$, $p = .77$) negative emotionality was controlled.

Discussion

Negative urgency is thought to characterize individuals who have especially strong reflexive behavioral and cognitive responses to negative emotions (Smith & Cyders, 2016), and is hypothesized to represent a central risk factor for general psychopathology (Carver et al.,

2017). In the face of negative emotions, those high on urgency are thought to be hyper-focused on relieving or avoiding the experience of negative affect in the short term, which may inadvertently increase or prolong the experience of negative emotions in the long term. These reflexive cognitive and behavioral responses to negative emotions are thought to explain the link between urgency and both internalizing and externalizing psychopathology (Smith & Cyders, 2016). Our findings provide support for this hypothesis: across four samples of retrospective data, and in two short-term EMA studies, individuals high on negative urgency were more likely to report using emotion regulation strategies that either reflected reflexivity or disengagement in the face of negative emotions or stress, relative to engagement-oriented strategies.

Meta-analysis had shown that neuroticism was moderately correlated with emotion regulation strategies such as withdrawal, wishful thinking, and rumination. Agreeableness and conscientiousness were correlated with less denial and more engagement (Carver & Connor-Smith, 2010; Connor-Smith & Flachsbart, 2007). Some prior work had shown that individuals high on negative urgency reported greater coping motives for substance use (Cyders & Coskunpinar, 2010). Our findings extend this work to show that in retrospective survey data, trait negative urgency was moderately correlated with reflexive responses to emotion, such as catastrophizing and rumination, or disengagement responses to stress, such as denial, and distraction, relative to engagement oriented strategies such as planning, positive reappraisal, perspective taking, active coping, planning, and reframing. Importantly, we observed these effects in *real time* using EMA. *When they were experiencing higher than average negative emotions*, participants high on negative urgency also had a tendency to report using emotion regulation strategies that were reflexive or disengagement focused. Although research has suggested that individuals high in distress may utilize more of *all* types of emotion regulation

strategies (Compas et al., 2017), our work suggests that those high on negative urgency tend to utilize relatively more emotion regulation strategies that, in the long run, are likely to prolong their own distress, and relatively fewer strategies that may be effective in the long term.

The current findings suggest that, in terms of negative urgency, “impulsive behaviors” that are triggered in response to negative emotions are not just automatic behavioral responses (such as poor inhibition) (Billieux, Gay, Rochat, & Van der Linden, 2010; Chester, D. S., Lynam, D. R., Milich, R., DeWall, 2017; Emery, King, & Levine, 2014), but also automatic *cognitive* responses reflecting emotional reactivity or attempts at regulation (Carver et al., 2017). Individuals high on negative urgency may have poor resources for coping with stress and regulating negative emotions, or they may find the use of effortful and long-term focused emotion regulation strategies difficult in the face of negative emotion that produces strong automatic responses (Cyders & Coskunpinar, 2010). This may explain both the prior findings of associations between negative urgency and coping motives for substance use, as well as its association with internalizing problems. Importantly, these emotion regulation responses have been consistently linked to both internalizing and externalizing psychopathology (Aldao et al., 2010), suggesting that the use of these forms of emotion regulation may mediate the association between trait negative urgency and the development of psychopathology over time. It may be that interventions designed to improve emotion regulation, such as dialectical behavioral therapy (Linehan & Wilks, 2015), may be important interventions for at-risk individuals high on negative urgency.

Finally, negative urgency may also exhibit substantial overlap with negative emotionality and positive urgency (Cyders & Smith, 2008; Smith & Cyders, 2016). In exploratory, *post-hoc* analyses, we tested whether the associations between negative urgency and emotion regulation

generalized to positive urgency or were observed after partialling for negative emotionality. We observed mixed evidence of generalization or unique prediction, and because these hypotheses were not considered *a-priori*, we refrain from discussing our findings. However, the considerable overlap both we and others have observed between positive and negative urgency, and the “urgencies” and negative emotionality, raises important questions about the nature of each construct. For example, it is difficult to know how to interpret negative urgency in the absence of (or controlling for) negative emotionality. There is evidence, for example, that even “affect free” impulsivity items load with neuroticism items (Sharma, Markon & Clark, 2014), suggesting that negative emotionality and negative urgency (and, by extension, positive urgency) may be inextricable. Similarly, it is difficult to understand what emotion regulation strategies should be expected for those high on positive urgency, as there is little expectation that individuals would want to down-regulate or change positive emotions. Additional research on the distinguishability (or not) of these three constructs will be critical for the field to move forward in building mechanistic theories of their impacts on psychopathology (Strauss & Smith, 2009).

Limitations and future directions. Although the current study has several strengths, including the large sample sizes and the inclusion of EMA data, there are limitations that should be noted. First, except for Sample 1, our samples were all from one city in the Pacific Northwest of the United States and were mostly college students, who represent a relatively restricted range of the broader population. Future research should work to test whether these effects generalize to more ethnically and economically diverse samples, as well as testing these associations in older samples. Second, in the EMA, we did not assess emotion regulation strategies in reference to any specific negative emotional experience or stressor. The benefit of this approach is that it does not require participants to make a judgment about the causes and effects of their behaviors.

However, this approach may over-focus on discrete events, or misunderstand attempts to cope with complex, ongoing stressors (see Folkman & Moskowitz, 2000 for a discussion). Moreover, neither our cross-sectional nor our EMA design were optimal to detect mediation (MacKinnon, Fairchild, & Fritz, 2007). Prospective research that examines how both emotion regulation and psychopathology emerge over time in relation to individual differences in negative urgency is critical to understanding the temporal sequencing of these associations.

Finally, although we hypothesized that the association between negative urgency and emotion regulation in part explains how urgency raises the risk for psychopathology, we did not explicitly test this hypothesis for several reasons. First, only Samples 1 and 2 included data on psychopathology, and the instruments used to measure psychopathology differed across those two samples, making broad conclusions (and meta-analysis) difficult. Moreover, none of our samples were specifically selected for the presence of psychopathology, because we interested in whether negative urgency was characterized by specific patterns of emotion regulation regardless of the presence of psychopathology. Although the individuals high in negative urgency in the current samples are not necessarily analogous to high-urgency individuals which may be observed in clinical samples, there may be some evidence that generalization is reasonable. First, negative urgency has been shown to predict the onset of psychopathology (Riley, Combs, Jordan, & Smith, 2015; Settles, Cyders, & Smith, 2010). Moreover, Aldao & colleagues (2010) showed that clinical populations exhibited consistently *stronger* associations between ER and psychopathology, which may suggest that our current findings may also be stronger in clinical samples. However, it will be critical to test this hypothesis in clinical samples. Studying these dynamics in both clinical and non-clinical population may help us understand normative

differences in emotion regulation that can become pathological over time, and which are likely to be more prevalent in clinical populations.

Summary and clinical implications. Negative urgency is associated with risk for externalizing disorders that are characterized by rash action, such as problems with alcohol and drug use, binge eating, and gambling as well as depressive, anxiety and borderline symptoms (Berg et al., 2015; Cyders & Smith, 2008), and we showed that negative urgency was also associated with using emotion regulation strategies that themselves were associated both internalizing and externalizing psychopathology (Aldao et al., 2010). Although our cross-sectional and EMA studies could not conclusively test such an association, it may be that emotion regulation is a critical mediator of the relations between negative urgency and psychopathology. Our findings also suggest some specific targets of intervention. Importantly, although the *ratio* of maladaptive to adaptive strategies was associated with negative urgency, we found no specific associations between negative urgency and adaptive strategies. It may be that psychopathology among those high on urgency is driven by the simultaneous use of maladaptive strategies, rather than a deficit in adaptive strategies. Thus, it may be important to help individuals high on negative urgency learn emotion regulation strategies than can *replace* maladaptive ones, rather than simply focusing on encouraging the use of adaptive strategies. Some prior work has shown that real-time assessment of emotion regulation strategies can be used to personalize clinical interventions (Chen et al., 2017). Studies that examine how emotion regulation interventions may work in real time is a critical area of future research.

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Table 1: Demographics and descriptions of samples

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Sample Type	Community	College	College	College	Community
	Cross-sectional	Cross-sectional /	Cross-sectional	Cross-sectional	Cross-sectional &
Data collection Method		EMA			EMA
Emotion Regulation Measure	CERQ	CERQ	COPE	COPE	CERQ
<i>N</i>	281	154 / 147	384	449	51
% Female	55%	53%	69%	62%	71%
Age	16.53 (0.50)	18.44 (0.69)	18.54 (1.89)	19.06 (1.63)	16.58 (0.99)
% White	41%	62%	52%	44%	57%
% Black	21%	1%	3%	3%	0%
% Asian/Pacific Islander	16%	37%	32%	50%	14%

*CERQ = Cognitive Emotion Regulation Questionnaire. COPE= Brief COPE

Table 2: Mean levels of negative urgency and emotion regulation across samples

	Sample 1			Sample 2		
	Mean (SD)		α	Mean (SD)		α
Negative urgency	2.42	(0.83)	0.86	2.66	(0.61)	0.80
<i>Trait Emotion Regulation</i>						
Self-Blame	2.47	(0.79)	0.72	2.92	(0.80)	0.80
Acceptance	3.02	(0.89)	0.69	3.30	(0.81)	0.77
Rumination	2.71	(0.85)	0.65	3.21	(0.93)	0.76
Positive Focus	2.16	(0.84)	0.79	2.32	(0.93)	0.88
Planning	2.83	(0.93)	0.74	3.34	(0.93)	0.82
Reappraisal	2.93	(1.01)	0.80	3.33	(0.99)	0.84
Perspective Taking	3.05	(1.00)	0.80	3.20	(0.88)	0.78
Catastrophizing	2.05	(0.83)	0.68	1.97	(0.74)	0.73
Blame Others	2.01	(0.76)	0.78	1.93	(0.57)	0.77
	Sample 3			Sample 4		
	Mean (SD)		α	Mean (SD)		α
Negative urgency	2.55	(0.84)	0.85	2.51	(0.74)	0.88
<i>Trait Emotion Regulation</i>						
Active	3.00	(0.62)	0.63	3.01	(0.63)	0.64
Planning	3.08	(0.69)	0.71	3.10	(0.69)	0.74
Restraint	2.76	(0.65)	0.54	2.65	(0.68)	0.58
Growth	3.06	(0.69)	0.70	3.05	(0.70)	0.72
Humor	2.45	(0.89)	0.84	2.41	(0.91)	0.85
Acceptance	2.98	(0.70)	0.72	2.96	(0.67)	0.66
Denial	1.66	(0.69)	0.78	1.73	(0.74)	0.79
Distraction	2.72	(0.66)	0.44	2.63	(0.71)	0.52
	Sample 2			Sample 5		
	Mean (SD)		α	Mean (SD)		α
Negative urgency	2.66	(0.61)	0.80	2.47	(0.54)	0.84
<i>EMA Emotion Regulation</i>						
Acceptance	0.29	(0.25)	--	0.22	(0.19)	--
Problem Solving	0.26	(0.23)	--	0.27	(0.23)	--
Rumination	0.23	(0.23)	--	0.14	(0.13)	--
Reframing	0.16	(0.17)	--	0.15	(0.21)	--
Distraction	0.20	(0.21)	--	0.19	(0.21)	--
Avoidance	0.17	(0.20)	--	0.15	(0.20)	--
Suppression	0.16	(0.20)	--	0.11	(0.18)	--
Nothing	0.29	(0.27)	--	0.26	(0.23)	--

Table 3. Trait correlations of negative urgency with emotion regulation

		Sample 1	Sample 2		
<i>CERQ</i>		<i>r</i>	<i>r</i>	<i>Pooled r</i>	<i>95% CI</i>
Reflexive / Engagement Ratio		0.36	0.40	0.39	(0.30 - 0.49)
		Sample 1	Sample 2		
<i>Reflexive</i>		<i>r</i>	<i>r</i>	<i>Pooled r</i>	<i>95% CI</i>
Self-Blame		0.30	0.37	0.34	(0.25 – 0.43)
Catastrophizing		0.44	0.44	0.47	(0.38 – 0.56)
Blame Others		0.24	0.08	0.17	(0.01 – 0.34)
Rumination		0.36	0.42	0.40	(0.31 – 0.50)
<i>Engagement</i>					
Acceptance		0.11	0.06	0.09	(0.00 – 0.19)
Positive Focus		0.01	-0.03	-0.01	(-0.10 – 0.09)
Planning		-0.01	-0.16	-0.07	(-0.22 – 0.07)
Positive Reappraisal		-0.08	-0.29	-0.18	(-0.39 – 0.03)
Perspective Taking		0.01	-0.23	-0.10	(-0.34 – 0.13)
		Sample 3	Sample 4		
<i>COPE</i>		<i>r</i>	<i>r</i>	<i>Pooled r</i>	<i>95% CI</i>
Disengagement / Engagement Ratio		0.44	0.27	0.38	(0.18 - 0.57)
		Sample 3	Sample 4		
<i>Disengagement</i>		<i>r</i>	<i>r</i>	<i>Pooled r</i>	<i>95% CI</i>
Denial		0.35	0.34	0.36	(0.29 – 0.42)
Distraction		0.20	0.27	0.24	(0.17 – 0.32)
<i>Engagement</i>					
Active		-0.26	0.02	-0.12	(-0.39 – 0.15)
Planning		-0.22	0.02	-0.10	(-0.35 – 0.14)
Restraint		-0.14	0.09	-0.02	(-0.25 – 0.20)
Growth		-0.23	0.02	-0.10	(-0.35 – 0.14)
Humor		0.05	0.18	0.12	(-0.02 – 0.25)
Acceptance		-0.06	0.10	0.02	(-0.14 – 0.18)

*95% confidence interval (CI) for bolded pooled coefficients do not contain zero. CERQ = Cognitive Emotion Regulation Questionnaire. COPE = Brief COPE

Table 4. Correlations of trait negative urgency with EMA reported emotion regulation.

EMA Correlations	Sample 2	Sample 5		
	<i>r</i>	<i>r</i>	<i>Pooled r</i>	<i>95% CI</i>
Reflexive or Disengagement /Engagement Ratio	0.27	0.14	0.24	(0.11 – 0.38)
	Sample 2	Sample 5		
<i>Reflexive or Disengagement</i>	<i>r</i>	<i>r</i>	<i>Pooled r</i>	<i>95% CI</i>
Rumination	0.33	0.25	0.32	(0.18 – 0.45)
Distraction	0.35	-0.06	0.17	(-0.25 – 0.59)
Avoidance	0.22	-0.08	0.09	(-0.12 – 0.39)
Suppression	0.29	-0.19	0.07	(-0.21 – 0.55)
<i>Engagement</i>	<i>r</i>	<i>r</i>	<i>Pooled r</i>	<i>95% CI</i>
Reframing	0.24	-0.23	0.02	(-0.45 – 0.49)
Acceptance	0.08	0.02	0.06	(-0.07 – 0.20)
Problem Solving	-0.01	-0.16	-0.05	(-0.18 – 0.09)
Nothing	-0.23	0.09	-0.09	(-0.40 – 0.22)

*95% confidence interval (CI) for bolded pooled coefficients do not contain zero.

Emotion regulation reflects strategies reported while experiencing negative emotions.