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Distress Tolerance Predicts Day-To-Day Emotion Regulation Behaviors

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COMPLIANCE PAGE

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ABSTRACT

Distress tolerance (DT), or the ability to effectively withstand aversive internal experiences, is related to diverse physical and mental health benefits, including resilience to depression, anxiety, and substance misuse. DT might prevent health problems by promoting more adaptive and less maladaptive emotion regulation decisions in the face of stressful events. The present study—a pilot investigation that is the basis for a forthcoming study—tested this hypothesis by examining between- and within-person associations of DT with a repertoire of 12 common emotion regulation strategies. We recruited 25 high-anxiety university students to complete surveys of DT and emotion regulation efforts in response to stressors for 14 consecutive days. Multilevel structural equation modeling analyses indicated that higher DT was inversely associated with select maladaptive regulatory strategies (i.e., procrastination and rumination) both within and across persons, although this trend unexpectedly did not extend to behavioral avoidance, experiential avoidance, drug use, suppression, or distraction. Findings regarding adaptive strategies indicated that higher DT may enable greater reflection, reappraisal and acceptance within, but not across, persons. Also, higher DT unexpectedly predicted less social support seeking and affect labeling between- and within-persons. In several cases, there were discrepant associations among DT and emotion regulation strategies across between- and within-person levels. In these scenarios, within-person associations were most consistent with theory and evidence. Taken together, findings suggest that higher DT limits maladaptive emotion regulation behaviors and inconsistently predicts adaptive regulatory efforts. We discuss our findings and their implications for theory and intervention.

TABLE OF CONTENTS

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LIST OF TABLES

Distress Tolerance Predicts Day-to-Day Emotion Regulation Behaviors

Distress tolerance (DT) refers to the ability to effectively withstand aversive internal experiences, such as uncomfortable emotions, thoughts, physical sensations, and pain. It buffers against a range of poor health outcomes, including risky behaviors (e.g., pathological gambling, reckless driving), depression and anxiety, problematic eating behaviors, and substance misuse (Anestis, Fink, Smith, Selby, & Joiner 2011; Beck, Daughters, & Ali, 2013; Brown, Lejuez, Kahler, Strong, & Zvolensky, 2005; Clen, Mennin, & Fresco, 2011; Schmidt, Mitchell, Keough, & Riccardi, 2011). Though DT is often conceptualized and measured as an individual difference variable, it also has a state component that varies within-person as a function of current situations, goals, and resources (Veillieux et al., 2018).

DT is thought to have this buffering effect because it promotes healthy emotion regulation. In other words, higher DT should help individuals choose better ways to modify their (negative) emotional responses (Gross, 2015). As such, DT acts as an emotion regulation *ability* that facilitates the selection and successful implementation of emotion regulation *strategies* (Naragon-Gainey, McMahon, & Chacko, 2017; Tull & Aldao, 2015). Limited DT should lead to avoidant emotion regulation attempts, such as behavioral avoidance (e.g., avoiding situational triggers of negative emotion), rumination (e.g., perseverative, non-productive analysis of problems), suppression (e.g., suppressing intrusive thoughts), and distraction (Jeffries, McLeish, Kraemer, Avallone, & Fleming, 2016; Leyro, Zvolensky, & Bernstein, 2010). In contrast, high DT should translate into more approach-oriented emotion regulation strategies, including reappraisal (e.g., considering alternate perspectives), affect labeling (e.g., putting

feelings into words), problem solving (e.g., formulating practical ways to minimize emotional vulnerabilities), and recruitment of social support.

These differing repertoires for high versus low DT are important because emotion regulation strategy selection has significant physical and mental health consequences (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Jamieson, Nock, & Mendes, 2012). Like DT, emotion regulation strategy use varies over time depending upon the current situation (Brans, Koval, Verduyn, Lim, & Kuppens, 2013; McMahon & Naragon-Gainey, 2018), and flexible strategy selection may be important in predicting positive outcomes (e.g., Aldao, 2013; Bonanno & Burton, 2013). Nonetheless, one's *overall tendency* to use certain strategies is also predictive of health outcomes, such that emotion regulation strategies can be categorized as adaptive or maladaptive based on their typical empirical associations with health outcomes (see Aldao, et al., 2010; Appleton, Buka, Loucks, Gilman, & Kubzansky, 2013; Appleton, Loucks, Buka, & Kubzansky, 2014); importantly, this distinction among regulation strategies is based on prior empirical evidence, as opposed to conceptual definitions of the strategies. Within this framework, maladaptive emotion regulation strategies such as suppression, avoidance, and rumination predict problematic eating behavior, substance misuse, and emotional problems (Aldao et al., 2010; McMahon & Naragon-Gainey, 2018, 2019). Conversely, adaptive emotion regulation strategies such as reappraisal and problem solving confer resilience to these same risky behaviors and mental health complaints (Aldao et al., 2010; McMahon & Naragon-Gainey, 2019).

1.1. Empirical Connections between Distress Tolerance and Emotion Regulation

Emotion regulation abilities like DT should predict which emotion regulation

strategies one uses and how successfully they are employed, with important consequences for physical and psychological well-being. Despite the strong conceptual connections between DT and emotion regulation strategies, there is limited empirical research on their association. Research evaluating DT via persistence on frustrating behavioral tasks (e.g., rapid mental arithmetic) has connected diminished DT with trait emotion regulation difficulties (e.g., Brandt, Johnson, Schmidt, & Zvolensky, 2012; Eichen, Chen, Boutelle, & McCloskey, 2017). Furthermore, low self-reported DT is related to deficits in specific emotion regulation abilities, including problems with impulse control, emotional awareness, and perceived access to emotion regulation strategies (; Van Eck, Warren, & Flory, 2017; Vujanovic, Bonn-Miller, Bernstein, McKee, & Zvolensky, 2010).

Most relevant to the current study, DT –an index of emotion regulation ability— has also been associated contemporaneously with specific emotion regulation *strategy use*. In a meta-analytic review, Naragon-Gainey and colleagues (2017) examined correlations between trait DT and 10 distinct emotion regulation strategies. This analysis revealed inverse between-person relationships between DT and experiential avoidance (i.e., avoidance of unwanted thoughts, emotions, or sensations), worry, rumination, and expressive suppression (i.e., inhibition of outward emotional expression) (*r* range = -.57 to -.19). In this same analysis, DT was positively, albeit weakly, linked with mindfulness (i.e., nonjudgmental awareness of internal experiences), problem solving, and reappraisal strategies (*r* range = .08 to .38). In other research, DT was inversely related to coping via substance use, which is often conceptualized as a maladaptive emotion regulation strategy (*r* range = -.33 to -.20)

(O'Cleirigh et al., 2007; Zvolensky et al., 2009). Collectively, these findings suggest that higher DT levels are linked with increased use of some adaptive emotion regulation strategies and decreased use of some maladaptive strategies, with small, and small-to-large effect sizes, respectively, according to Cohen's (1992) guidelines.

Although this existing research has begun to illuminate the connections between DT and emotion regulation strategy use, there are drawbacks to evaluating DT and emotion regulation strategies dispositionally. Given evidence of substantial momentary and daily changes in DT and emotion regulation strategy use (e.g., Brans et al., 2013; McMahon & Naragon-Gainey, 2019; Veilleux et al., 2018), a cross-sectional and dispositional index may not provide a very informative or accurate representation of how these phenomena unfold in daily life. In addition, trait measures cannot detect differential outcomes that may vary as a function of time or context (e.g., Bonanno & Burton, 2013), and they are more susceptible to various recall biases (Thomas & Diener, 1990). In contrast, intensive longitudinal designs, including daily diary studies, allow for fine-grained measurement of DT and emotion regulation strategy use in reaction to specific daily events. Moreover, they are able to parse between- versus within-person variation in associations between DT and emotion regulation strategy use. That is, they permit examination of how (1) individual differences in trait DT predict *aggregate* (i.e., across-day) levels of emotion regulation strategy use over the study timeframe, and (2) within-person fluctuations in DT predict within-person variation in emotion regulation strategy use. Of note, within-person analyses allow for a closer examination of potentially causal processes that are often of greater clinical interest than trait levels, as within-person analyses have implications for how altering a person's

emotion regulation behaviors may impact their well-being at that time (Zimmerman et al., 2019).

One existing study has evaluated DT in relation to momentary emotion regulation behavior (Veilleux et al., 2018). Veilleux et al. asked undergraduate students to complete self-report and behavioral measures of DT during a baseline session, and then to fill out surveys about stressful events and attendant emotion regulation choices seven times per day for one week. At each prompt, participants reported on DT and indicated whether they had experienced a stressful event since the last measurement occasion. If participants had experienced a stressful event, they were asked to rate the extent to which they had engaged in a set of emotion regulation strategies. Veilleux et al. reported that, on a between-person level, lower mean momentary DT was statistically significantly associated with greater reliance on behavioral avoidance, expressive suppression, thought suppression, and rumination (median r = .37). Meanwhile, the between-person associations between daily DT and reappraisal, acceptance, or problem solving were not statistically significant (median r = .21), raising the possibility of stronger associations between DT and maladaptive, versus adaptive, strategies in daily life. Veilleux et al. did not report within-person associations among momentary DT and emotion regulation strategy use.

1.2. Present Study

We tested how DT intersects with emotion regulation strategy use in the flow of daily life. We recruited high-anxiety university students, a group likely to endorse a range of adaptive and maladaptive emotion regulation choices (e.g., Aldao, Jazaieri, Goldin, & Gross, 2014; Blalock, Kashdan, & Farmer, 2016), to report on DT capabilities

and emotion regulation over a 14-day span. We anchored participants' daily reports of emotion regulation to stressful events likely to activate an emotion regulation goal (e.g., minimize rejection-induced negative affect) and, subsequently, emotion regulation strategy use. We expanded on prior research (e.g., Veilleux et al., 2018) by assessing a diversity of emotion regulation strategies, with the goal of formulating a more comprehensive description of the repertoire of emotion regulation strategies linked with DT (see McMahon & Naragon-Gainey, 2019). We measured five adaptive and seven maladaptive emotion regulation strategies due to their theoretical association with high and low levels of DT, respectively (Jeffries et al., 2016; Naragon-Gainey et al., 2017) (see a full list of strategies assessed in section 2.3.2.4).

Our primary objective was to examine the between- and within-person associations of DT with momentary emotion regulation strategy use. The between-person associations address overall tendencies (i.e., individual differences) in levels of DT and emotion regulation strategies, which are conceptually similar to dispositional assessments. In contrast, the within-person associations address how DT and emotion regulation strategies relate in a specific daily episode, allowing for the impact of shifting contextual features, demands, motivations, and resources that each person encounters over time. We had two main hypotheses. First, we hypothesized that higher trait DT, evaluated at baseline, would be linked with less maladaptive (e.g., rumination, expressive suppression, drug use) and more adaptive (e.g., reflection, acceptance, reappraisal) emotion regulation strategy use (Hypothesis 1); we anticipated small-to-medium effect sizes for all between-person correlations. Second, we predicted small-to-medium within-person associations between same-day DT and emotion regulation

strategy use (in a similar pattern as between-person associations) (Hypothesis 2). These hypotheses were based on theoretical associations between DT and emotion regulation strategies (Jeffries et al., 2016; Leyro et al., 2010; McHugh, Reynolds, Leyro, & Otto, 2013) and existing, albeit limited, evidence from cross-sectional and daily studies (Jeffries et al., 2016; Naragon-Gainey et al., 2017; Veilleux et al., 2018). To our knowledge, this is the first study to assess within-person associations among DT and emotion regulation strategy use.

Method

2.1. Participants

2.1.1. Sample characteristics. Participants for this study were 25 undergraduate students (18 females) from a Southeastern university. The mean age was 19.91 (*SD* = 1.00) years. The distribution of self-reported ethnicity was 60% White, 32% Asian American, 12% Hispanic/Latino, 4% African American, 4% American Indian/Alaskan Native, and 4% Pacific Islander.

Participants were recruited on the basis of anxiety symptom severity. Specifically, students who scored 10 or higher on the Generalized Anxiety Disorder-7 questionnaire (GAD-7; Spitzer, Kroenke, Williams, & Löwe, 2006) *or* scored 6 or higher on the Mini Social Phobia Inventory questionnaire (Mini-SPIN; Connor, Kobak, Churchill, Katzelnick, & Davidson, 2001) were invited to participate in the study. A score of 10 on the GAD-7 designates moderate levels of anxiety and a probable generalized anxiety disorder (GAD) diagnosis (Spitzer et al., 2006), whereas a score of 6 on the Mini-SPIN indicates a probable generalized social anxiety disorder (SOC) diagnosis (Connor et al., 2001). We recruited from a high-anxiety population in order to

enhance generalizability to a clinically distressed population and to increase variability in the maladaptive extremes of DT and emotion regulation outcomes (see Blalock, Kashdan, & Farmer, 2016; Decker, Turk, Hess, & Murray, 2008; Schmidt et al., 2011).

2.1.2. Data exclusion criteria. Following conventions in this research area (e.g., McMahon & Naragon-Gainey, 2018), we excluded reports that were completed outside of the specified time frame (the window for survey completion began at 5:00PM and ended at 2:00 AM each day). We chose this time frame in order to accommodate a wide range of schedules, such that participants were able to complete our brief questionnaires at any time during 5PM and 2AM. If participants mistakenly submitted more than one report per day within the specified timeframe, we used the most complete one, or the first one if all reports appeared complete. We did not exclude participant data for any other reason. After these exclusions, missing data was accommodated using full information maximum likelihood estimation.

2.2. Procedure

2.2.1. Baseline session. Participants were recruited based on their responses to the GAD-7 and Mini-SPIN, which were administered as part of a larger survey battery completed by psychology research pool students. Those scoring above one or both of our thresholds were sent e-mail invitations to the study. Participants who decided to enroll in the study were scheduled for an hour-long baseline session in our laboratory. During the baseline session, participants completed self-report measures on DT and related traits on a desktop computer. Next, the experimenter explained the daily diary procedures and reviewed the most important parts of the day-to-day assessments with the participant. This script guiding this interaction is included in Appendix A.

2.2.2. Daily diary. Participants received an e-mail at 5PM for 14 consecutive days (starting the day after the baseline session) containing a link to the diary survey. Each survey asked participants to identify the most stressful event they experienced that day. Next, they reported which emotions they felt in response to their most stressful event and rated the extent to which they used each of 12 emotion regulation strategies in response to the stressor.

Additionally, participants were asked to complete brief self-report measures of DT, anxiety sensitivity, and intolerance of uncertainty. (They completed anxiety symptom measures that are not relevant to the present study.) The order of the measures in the daily assessment battery was randomized, with the exception of those assessing daily stressors, emotional responses, and emotion regulation strategy use, which were always presented in the same order. All participants were compensated with academic credit for their participation.

2.2.3. Compliance procedures. Participants were informed that if they submitted the survey after 2AM the morning following survey (e-mail) delivery, their responses would be treated as missing for the purposes of compliance monitoring. Throughout the daily diary period, experimenters checked participants' data for completion. Specifically, experimenters monitored participants' compliance on the third, seventh, 11th and 14th days of their daily diary period. On those days, participants who failed to respond to at least two surveys since the previous check received a text message from our study team reminding them to complete the remaining questionnaires. Participants were encouraged at the baseline session to get in touch with the experimenters if they had questions while completing the daily study or encountered technical difficulties.

2.3. Measures

2.3.1. Trait measures. At baseline, we administered a number of widely used self-report measures of DT and related constructs. Although many of them include subscales, we used the total score from each measure in our analyses unless specified otherwise. Higher scores on all measures reflect greater levels of the construct unless specified otherwise.

2.3.1.1. *Distress tolerance*. The Distress Tolerance Scale (DTS; Simons & Gaher, 2005) is a 15-item measure of capacity to withstand negative psychological states (e.g., "I can't handle feeling distressed or upset"). Respondents indicated the extent to which each statement describes them using a 5-point Likert-type scale (1 = "strongly agree" to 5 = "strongly disagree"). The DTS contains four subscales (appraisal, absorption, regulation, and tolerance). The total score has previously exhibited high internal consistency (Cronbach's α range from .82 to .85) and test-retest reliability (r = .61 over 6 months) (Simons & Gaher, 2005). Moreover, prior research has documented strong criterion validity with respect to clinical and behavioral problems (Cougle, Bernstein, Zvolensky, Vujanovic, & Macatee, 2013; Vujanovic et al., 2010).

2.3.1.2. *Social anxiety symptoms.* We administered the Inventory of Depressive and Anxiety Symptoms (IDAS; Watson et al., 2007) social anxiety subscale. This subscale involves five items (e.g., "I found it difficult to make eye contact with people") that are rated on a 5-point Likert-type scale (1 = "not at all" to 5 = "extremely"). This scale has been administered to various university student and clinical samples, and we used respondents' scores, relative to norms, to characterize the present sample in terms of anxiety symptom severity (Stasik-O'Brien et al., 2018).

2.3.1.3*. Generalized anxiety symptoms.* We administered the Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger & Borkovec, 1990) to measure generalized anxiety symptoms. This widely-used measure is composed of 16 items (e.g., "I am always worrying about something") that evaluate core symptoms of generalized anxiety on a 5-point Likert-type scale (1 = "not at all typical of me" to 5 = "very typical of me"). Like the IDAS social anxiety subscale, we used the PSWQ to describe the severity of anxiety problems in our sample using published norms (Gillis, Haaga, & Ford, 1995). Neither the PSWQ nor IDAS were involved in hypothesis testing.

2.3.2. Daily measures. Unless specified otherwise, we used the total score from each measure in our analyses, and higher scores reflect greater levels of the construct. For all daily measures, participants were asked to answer on the basis of their experiences that day.

2.3.2.1. *Distress tolerance.* The Distress Tolerance Scale-Daily (DTS-Daily; Hawkins, Macatee, Guthrie, & Cougle, 2013) features six items drawn from the DTS (Simons & Gaher, 2005; items 3, 4, 10, 12, 13, and 15) that had the highest item-total correlations in an undergraduate sample (Hawkins et al., 2013). To adapt the DTS for daily use, the timeframe in the questionnaire instructions was modified: "Think of times that you felt distressed or upset today. Select the response for each item that best describes your beliefs about feeling distressed or upset today". This measure has demonstrated high internal consistency reliability in prior daily diary studies (Hawkins et al., 2013; Macatee, Capron, Guthrie, Schmidt, & Cougle, 2015).

2.3.2.2. *Daily stressors.* We asked participants to select the most stressful

event of their day (i.e. “take a moment to think back through your day and pick out the most stressful or unpleasant thing that happened to you”) and categorize it with one of the following descriptors: school, friends, physical health, romantic relationship or dating life, work, family, home, and other. Each category was presented along with an example [e.g., “school (e.g., bad grade, presentation)] and after participants selected one of the categories, they were asked to describe their event in further detail. In order to ensure that all participants identified a concrete stressful event, an additional response option was presented after all the descriptive categories: “I can’t remember any stressful or unpleasant events, show me a list of common everyday stressors”. Participants who selected this option viewed a list drawn from the Daily Stress Inventory (DSI; Brantley, Waggoner, Jones, & Rappaport, 1987). We presented 50 out of the 58 items in the DSI; we excluded items 3, 22, 25, 30, 49, 54, 56, and 57, because they did not refer to concrete events (e.g., item 3 “thought about unfinished work”).

If a participant did not select any of the 50 items, they were given the option to write their own stressful event. Regardless of whether participants independently identified a stressful event and selected a category or chose a stressful event from the DSI, they were asked to describe their most stressful event in 10 words or less. The purpose of these items was to ensure participants identified a concrete stressful event, which they then used as an anchor when rating their use of emotion regulation strategies. We did not use data from this questionnaire in any of our analyses.

2.3.2.3. *Emotional responses to daily stress.* After participants identified the most stressful event of the day, they rated the extent to which they experienced anxiety, irritability or anger, sadness, and guilt in response to the stressor using sliders with

poles at 0 (“not at all”) and 100 (“extremely”) and tick marks at 10-point increments along the bar. We did not use data from these questions in any of our analyses; the purpose of these questions was to ensure participants reflected on their emotions in response to the most stressful event of their day before they answered questions regarding emotion regulation behaviors.

2.3.2.4. *Emotion regulation behavior.* After selecting a stressor and rating accompanying emotions, we assessed use of 12 emotion regulation strategies. Participants were instructed to indicate the degree to which they employed all 12 strategies, as opposed to selecting 1 primary strategy per occasion, based on evidence that people often recruit multiple strategies simultaneously (Brans et al., 2013). During each daily assessment, participants rated the extent to which they engaged in seven maladaptive strategies (behavioral avoidance, experiential avoidance, rumination, expressive suppression, drug use, distraction, and procrastination) and five adaptive strategies (reflection, acceptance, reappraisal, affect labeling, and social support seeking) in response to stressor-induced emotions (e.g., “I avoided the situation or people that led to my feelings”; “I couldn’t stop thinking about my feelings (how bad I felt, why I felt that way”). Each strategy was assessed via a single item with a 5-point Likert-type scale (1 = “not at all”; 2 = “a little”; 3 = “moderately”; 4 = “very much”; 5 = “extremely”). The response to each item was used as our daily measure of the corresponding strategy. The majority of the items have been tested in a previous study (see the project and materials here: https://osf.io/pwy9r/), and one item (i.e., affect labeling) was created for the present study. See Appendix B for the exact wording for all aspects of the questionnaire.

2.3.3. Data Analysis

2.3.3.1. Preprocessing steps. We computed a total/mean score for each self-report questionnaire following published guidelines, or else (for unpublished measures) using scoring procedures we outlined above. We also examined intraclass correlations for the daily variables to characterize the amount of variance at each level and ensure that there was sufficient variability to analyze both between- and within-person levels.

2.3.3.2. Main analyses. We used Mplus version 8 (Muthén & Muthén, 2017) to conduct our main analyses. Upon excluding data based on criteria specified above, we used robust full information maximum likelihood estimation (i.e., MLR) in Mplus to handle missing data. We used multilevel structural equation modeling (MSEM) in Mplus to test our main hypotheses. To test Hypothesis 1, we calculated between-person correlations (which hold constant daily variability) between mean levels of each of the emotion regulation strategies and trait (i.e., baseline) DT. To test Hypothesis 2, we calculated within-person correlations (which hold constant individual differences) between same-day levels of each of the emotion regulation strategies and daily self-reported DT.

We followed the Mplus MSEM default for within-person (i.e., daily-level) variables to be person-centered. We treated all daily outcomes as continuously distributed, and we did not transform any outcomes.

We used Cohen's effect size guidelines, such that correlations between |.10| and |.30| were considered small, those between |.30| and |.50| were deemed medium, and correlations greater than |.50| were deemed large (Cohen, 1992). Additionally, we designated correlations below |.10| as very small. Throughout the results and

discussion, we focused our interpretations on effect sizes and listed statistical significance levels.

Results

3.1. Sample Characteristics

The sample mean for GAD symptoms (PSWQ *M* = 64.45, *SD* = 13.02) was at the 90th percentile of symptom severity for U.S. adults (Gillis et al., 1995). The IDAS sample mean (*M* = 15.40, *SD* = 5.11) was at approximately the 70th percentile of social anxiety severity, relative to norms from a combined sample of over 5,000 students, community adults, and psychiatric and medical patients (Stasik-O'Brien et al., 2018).

Participants in our sample completed an average of 11.52 (*SD* = 2.89) out of 14 possible diary entries, reflecting a compliance rate of 82%. Regarding stressor frequency, school-related events were most frequently endorsed, whereas home-related events were least frequent (see Appendix C for rates of all event types). This distribution generally was consistent with expectations for a university student population. The predominant emotional responses to stressors were, in decreasing order of frequency, anxiety, guilt, irritability/anger, and sadness (see Appendix D for endorsement rates).

Table 1 presents descriptive statistics for the daily variables. Intraclass correlation coefficients (ICCs) indicated that 22% of the variability in daily DT and 10% to 39% of variability in emotion regulation strategies was attributable to between-person differences. Moreover, the mean ICC (20.7%) for emotion regulation behaviors was lower than the corresponding estimate in a diary study that assessed a very similar set of strategies (mean ICC = 35% in McMahon & Naragon-Gainey, 2019). Aggregate

rates of emotion regulation strategy use, distraction, procrastination, acceptance, and experiential avoidance were most frequently endorsed across the study timeframe, whereas drug use, reappraisal, and behavioral avoidance were least frequently reported.

3.2. Main Analyses

3.2.1. Hypothesis 1.

To test hypothesis 1, we examined bivariate between-person associations between DT and emotion regulation strategy use. We did this by examining correlations among *trait* DT, assessed at baseline, and average levels of emotion regulation strategy use, as aggregated from diary reports. As shown in Table 1, nearly half of correlations among trait DT and maladaptive strategies were very small (i.e., $r < |.10)$. We also observed small (i.e., $|.10| < r < |.30|$) correlations with rumination, and medium (i.e., $|.30| < r < |.50|$) associations with procrastination, behavioral avoidance, and drug use. Regarding correlations with adaptive strategies, as with maladaptive strategies, nearly half were very small. In contrast, correlations with reappraisal and affect labeling were small, and the one with social support was medium. Overall, seven out of 12 within-person correlations were in the expected direction; three out of 12 were in the expected direction and greater than |.10|; and only one (i.e., the correlation with procrastination) out of 12 was in the expected direction, greater than |.10|, and statistically significant at the .05 alpha level.

3.2.2. Hypothesis 2.

To test hypothesis 2, we examined bivariate within-person correlations between daily DT and same-day emotion regulation strategy use (see Table 1). The majority of

correlations between daily DT and maladaptive strategies were very small. Two exceptions were a small correlation with procrastination, and a medium one with rumination. Correlations involving adaptive strategies were all small, ranging between |.10| and |.20|. Overall, nine out of 12 correlations were in the expected direction; five out of 12 were in the expected direction and greater than |.10|; and four out of 12 were in the expected direction, greater than |.10|, and statistically significant at the .05 alpha level.

Discussion

Distress tolerance (DT), or the capacity to withstand aversive internal stimuli, is an index of emotion regulation *ability*, such that higher DT should facilitate more adaptive emotion regulation *strategy use*, whereas DT deficits should promote maladaptive or avoidant emotion management. Despite the strong theoretical link between these two constructs, this hypothesis remains largely untested. Thus, the empirical associations between DT and emotion regulation strategy choices are not well understood. Using daily diary assessments, we examined between- and within-person associations of DT and stress-provoked emotion regulation among high-anxiety university students.

4.1. Distress Tolerance and Maladaptive Emotion Regulation

We expected that DT would predict, both across and within participants, diminished use of maladaptive emotion regulation strategies in the face of daily stressful events. This hypothesis was partially supported, such that DT was inversely associated with a subset of maladaptive strategies. At the between-person level, *trait* DT was most closely (and inversely) related to procrastination, behavioral avoidance, and rumination

in expected ways (*r*s = -.45, -.30, and -.18, respectively). This group of results adds to a body of cross-sectional research documenting inverse between-person associations of trait DT with rumination and behavioral avoidance (Jeffries et al., 2016; Naragon-Gainey et al., 2017). In these prior studies, which were focused on a more limited repertoire of emotion regulation behaviors, relative to the current study, effect sizes ranged from small to medium. Taken together, evidence across these studies suggests that higher levels of trait DT may prompt people to rely less regularly on rumination, procrastination, and behavioral avoidance when responding to stress-induced negative emotion.

Within-person correlations revealed similar results, such that procrastination and rumination—two of the strategies most closely linked with trait DT—also had the strongest associations with *daily* DT at the within-person level (*r*s = -.15 and -.35, respectively), although the relative magnitude of these two correlations was inverted, compared to the between-person associations. These findings expand upon one prior study that examined associations between momentary reports of both DT and a number of emotion regulation strategies (Veilleux et al., 2018). It is important to keep in mind, however, that Veilleux et al. aggregated participants' reports of momentary DT and emotion regulation strategy use, and then assessed their relationship on a *between-person* level. Although Veilleux et al. did not examine within-person links among DT and emotion regulation behavior, their methodology represents a substantial improvement over purely cross-sectional research; this makes their findings a useful point of comparison for associations among DT and emotion regulation behavior as it occurs in daily life. Similar to the present study, Veilleux et al., found moderate, inverse correlations between momentary DT and rumination. Cross-study discrepancies

notwithstanding, the results from these investigations suggest that people high in trait DT as well as daily DT capabilities turn less often to rumination and procrastination to manage stress-induced negative emotion.

Although some of the present results were consistent with hypotheses and prior research, others were unexpected. At the between-person level, higher trait DT was moderately linked with *increased* drug use (i.e., $r > |.30|$). This was unexpected, as theory and prior evidence dictate that higher DT predicts diminished reliance on drugs as coping mechanism (Zvolensky et al., 2009). Also, several correlations among DT and maladaptive emotion regulation strategies were trivially small. For instance, three out of seven between-person correlations with trait DT (experiential avoidance, suppression, and distraction) and five out of seven within-person correlations with same-day DT (all but those involving rumination and procrastination) were smaller than |.10|. This pattern of associations counters theory and clinical consensus that suggest higher DT buffers against these maladaptive choices (i.e., suppression, distraction, and experiential avoidance) (Jeffries et al., 2016; Naragon-Gainey et al., 2017; Veilleux et al., 2018). As such, it signals that DT, whether conceptualized as a trait or a time-varying regulatory ability, may not have a *comprehensive* beneficial influence on emotion regulation efforts. Further intensive longitudinal assessment research in larger samples is needed to resolve these unexpected findings.

4.2. Distress Tolerance and Adaptive Emotion Regulation

We hypothesized that higher DT would predict, both across and within people, greater use of adaptive emotion regulation strategies in response to daily stressful events. There was inconsistent support for this hypothesis in the present data. On a

within-person basis, when individuals reported higher daily DT, they also reported using more reflection, acceptance, and reappraisal. This result suggests that higher daily DT may enable individuals to manage their emotions in a more engaged, deliberate way. However, daily DT also predicted *reduced* use of social support and affect labeling on a within-person basis. Additionally, all between-person associations among trait DT and adaptive emotion regulation strategies were either unexpectedly negative or very small. This predominance of inverse or negligible associations contradicts theories that posit that DT confers resiliency against emotional disturbance by enabling more adaptive emotion regulation (e.g., Jeffries et al., 2016; Leyro et al., 2010; McHugh et al., 2013). It also counters extant between-person evidence, which has documented that higher DT is linked with *greater* use of reappraisal and acceptance, although effect sizes tend to be small (Jeffries et al., 2016; Naragon-Gainey et al., 2017;).

Both between and within-person variations in DT were inversely linked with social support seeking and affect labeling, with effect sizes ranging from small to medium. It is possible that these findings indicate a need to reconsider whether these strategies are truly adaptive. However, the theoretical and empirical foundation for the positive association between DT and adaptive emotion regulation makes this interpretation unlikely. A more plausible interpretation is that the benefits of utilizing these strategies may depend on contextual characteristics, such as what sorts of people one seeks for comfort, or whether affect labeling leads to ruminative (vs. understanding) thinking about one's emotions. Indeed, prior research has documented the importance of considering context when studying emotion regulation (e.g., see Aldao, 2013). An idiographic approach to emotion regulation measurement may be necessary to capture

the relevant contextual variables.

In the present study, between- and within-person associations of DT with adaptive and maladaptive emotion regulation choices were sometimes substantially different. One correlation involving trait DT was in the expected direction, greater than |.10|, and statistically significant at the .05 alpha level; four of the corresponding correlations with daily DT met these conditions. There were even instances where correlations flipped *direction* from between- to within-person contexts. For example, at the between-person level, people high in trait DT reported *increased* drug use. Meanwhile, higher daily DT was associated with *decreased* drug use at the within-person level, although with a very small effect. In a similar fashion, individual differences in trait DT were *negatively* linked with reappraisal, whereas higher within-person daily DT levels predicted greater endorsement of reappraisal to counteract negative emotion. Across these two preceding examples, within-person associations were more consistent with theory and evidence that suggest higher DT should predict decreased maladaptive and increased adaptive emotion regulation efforts.

This set of contradictory findings across between- and within- person levels of analysis may be attributable to a more fine-grained assessment of DT at the daily (vs. trait) level. Our daily measure asked individuals to reflect on their day and rate their perceived level of DT *during that day*, whereas our baseline measure provided no temporal anchor, instead asking individuals to report on their DT *globally* (across time and situations). Asking individuals to report on perceived levels of DT without a specific timeframe might lead to a biased estimate of their true level of DT; this requires individuals to recall numerous instances when they have been distressed and compute

an average on the spot. Indeed, some evidence for this potential bias is observable in the weak between-person association among trait and daily DT (r = .11). Additionally, the fact that daily ratings of DT were contemporaneous with emotion regulation ratings increases the likelihood that, as participants rated daily DT, they were reflecting on how well they were able to tolerate the very same stressful experiences that prompted the emotion regulation efforts described at the same measurement occasion. In turn, this concordance among evaluations of daily DT and emotion regulation behaviors would lead to more precise estimates of how DT levels influence emotion regulation strategy use at the within-person (vs. between-person) level.

4.3. Theoretical and Clinical Implications

Our findings have implications for theories that point to DT as a key determinant of emotion regulation strategy use (e.g., Jeffries et al., 2016; Leyro et al., 2010). We found that individual differences and person-specific variations in DT consistently predicted students' use of several maladaptive strategies, supporting the hypothesis that higher DT may avert maladaptive cognitive and behavioral responses to emotion. At the same time, DT's associations with most adaptive emotion regulation strategies were small and inconsistent across between- and within-person levels. This finding joins a body of work reporting small correlations (rs < .30) among DT and adaptive emotion regulation strategies (i.e., reappraisal and acceptance) (Jeffries et al., 2016; Naragon-Gainey et al., 2017). Taken together, these results suggest that DT may be an important facilitator of adaptive emotion regulation, but the magnitude of its effects might be smaller than expected under the dominant theoretical frameworks. Further research is needed to determine the centrality of DT as a predictor of adaptive emotion

regulation; it is important to keep in mind this effect could vary across between- versus within-person levels.

Our findings also have the potential to inform interventions that aim to bolster healthy emotion management. Emotion regulation is an important predictor of many physical and mental health outcomes (e.g., Aldao et al., 2010). If our finding that DT predicts use of specific maladaptive and adaptive strategies in daily life (e.g., rumination, procrastination, acceptance) is replicated, it would suggest that DT is an important predictor of emotion regulation strategy use. This information could prove useful to clinicians aiming to determine what sorts of interpersonal, cognitive, and behavioral skills might strengthen adaptive emotion regulation routines (Zimmerman et al., 2019). The present results raise the possibility that targeting DT in the clinic might have beneficial prospective effects on at least some maladaptive emotion regulation strategies. In turn, this diminished use of maladaptive emotion regulation strategies among high-DT people could confer resiliency against the development of mental health problems, such as depression, anxiety, and eating disorders (Anestis et al., 2011; Clen et al., 2011; Schmidt et al., 2011). Indeed, there is preliminary evidence that improvements in DT over the course of psychotherapy correlate with symptom remission and adaptive psychosocial functioning (e.g., McHugh et al., 2014; Reese, Conway, Anand, Bauer, & Daughters, in press).

4.4. Limitations

There are several limitations to consider. First, the between-person sample size was small, relative to other investigations in this field. This study was designed as a preliminary examination of the association among DT and emotion regulation strategies;

these data were used for a power analysis, which indicated that a between-person sample of 175 people will provide us a power of .90 to detect our effects of interest, if they exist. This pilot study is the basis of a registered report submission[1], in which we propose to collect data from this full sample of 175 to provide a more comprehensive test of our hypotheses. Moreover, in the forthcoming report, we will be able to examine gender differences in DT levels as well in the relation between DT and emotion regulation strategy use. This is an important next step, given evidence that males exhibit higher DT than females (e.g., Kiselica, Webber, & Bornovalova, 2014); these higher levels of DT could in turn promote use greater use of a wider range of adaptive strategies, as well as diminished use of multiple maladaptive strategies.

Second, our diary methodology meant that we assessed the within-person variables once per day. Although diary studies greatly minimize recall bias, relative to typical cross-sectional designs, the time lag between stressful event occurrence (along with attendant emotion regulation choices) and diary completion could allow for some retrospective bias. Other ecological momentary assessment schedules, such as event-contingent reporting, could minimize this bias even further.

Third, although our sample was selected for high anxiety, our findings may not generalize to all clinical samples. It is possible that among individuals with higher levels of psychopathology, DT and emotion regulation exhibit different patterns of association. As an example, individuals with more severe anxiety may exhibit lower levels of DT than those examined here; this low DT, in turn, may prompt higher use of a greater number of maladaptive strategies, with stronger associations. Additionally, among more severely distressed anxious individuals, higher DT may exert stronger protective effects,

in the form of substantially higher use of adaptive strategies and significantly diminished reliance on maladaptive strategies. It is necessary to examine links among DT and emotion regulation behavior in clinical samples in order to establish whether DT is a viable mechanism to promote healthy emotion regulation among highly anxious individuals.

4.5. Conclusion

We found that DT predicted some, but not all, emotion regulation choices. DT was more consistently associated with maladaptive, compared to adaptive, strategies. Indeed, several of these maladaptive emotion regulation behaviors (i.e., procrastination and rumination) were substantially associated with DT at both between- and within-person levels. More intensive longitudinal research is needed to understand the connection between trait emotion regulation abilities such as DT and momentary emotion regulation decisions. This type of research has the potential to clarify how, or whether, DT protects against mental health problems.

Table 1. Descriptive Statistics

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Trait DT	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2. Daily DT	.11	(.23)	.11	-.06	.20***	-.01	-.15*	.20***	-.35***	-.10	.01	-.03	-.04	-.11**
3. Reflection	.02	--	(.17)	-.13*	.35***	.05	-.05	.19*	-.14*	.15*	0.00	.04	-.03	.17*
4. Beh avoid	-.30	--	-.05	(.19)	-.14	.08	.17*	.01	.37***	.12	.12	.23***	.09	.04
5. Acceptance	.09	--	.93*	-.12	(.20)	.01	-.11	.16*	-.25**	.18*	-.14	.06	.05	.15
6. Exp avoid	.08	--	.58	.61*	.52	(.21)	-.01	.15**	.08	.16**	.11	.33***	.09	.07
7. Procrastination	-.45*	--	-.26	.89*	-.25	.38	(.37)	-.15**	.33***	.04	.12	.25***	.08	.08
8. Reappraisal	-.17	--	.27	.02	.15	.41	.05	(.18)	-.16**	.05	.06	.03	-.08	.06
9. Rumination	-.18	--	-.12	.70*	-.22[1]	.51*	.62**	.39	(.13)	.18*	.19*	.22*	.01	.14*
10. Social support	-.36	--	.81	.33	.63	.68	.12	.31	.07	(.14)	-.26**	.15*	.07	.61***
11. Suppression	-.06	--	-.23	.53*	-.21	.34	.50*	.13	.83**	-.24	(.25)	.12	-.01	-.16*
12. Distraction	-.08	--	.11	.83**	.08	.67**	.75**	.25	.71**	.24**	.68*	(.29)	.04	.06
13. Drug use	.32	--	.37	.10	.42	.41	-.07	.17	.04	.11	.18	.36	(.10)	-.03
14. Affect label	-.21	--	.70	.29	.53	.70	.03	.39	.09	.80	-.01	.35	.53	(.26)
Mean	2.84	21.86	2.39	1.93	2.49	2.46	2.50	1.83	2.27	2.04	2.39	2.62	1.22	2.13
SD	0.71	6.74	1.07	1.16	1.20	1.07	1.43	0.93	1.16	1.18	1.24	1.30	0.64	1.18

Note. Intraclass correlations for daily variables are reported in parentheses on the diagonal. Within-person correlations are reported above the diagonal. Between-person correlations are reported below the diagonal. Trait DT = baseline distress tolerance; Daily DT = distress tolerance assessed daily; Beh avoid = behavioral avoidance; Exp avoid = experiential avoidance; Affect label = affect labeling. * denotes $p < .05$; ** $p < .01$, *** $p < .001$. [1]the standard error for this association was zero, this precluded calculation of *p*-value.

Appendix A

Below is the script research assistants will read to participants in order to explain the daily diary questionnaire. Text between brackets was not read aloud to participants. The sample daily diary questions sheet is located at the bottom of the document.

Great job with the study so far, that's all the tasks we have for you today. Before we wrap up, I want to give you the rundown of why we're doing the study and tell you about the second part. Our study is designed by W&M to figure out how students' emotional experiences happen over time. By completing questionnaires outside the lab, you'll help us learn more about how emotions occur in daily life. So, for the study to work, we're asking everyone to complete very brief daily questionnaires, once per day for 14 days. You would begin answering very brief questionnaires tomorrow evening, and by completing the online daily questionnaires, you will be able to earn 1.5 additional academic credits. So, for coming to the lab today AND answering our brief daily surveys, you'll get 2.5 academic credits shortly after the 14 days are up. Plus, you'll get the chance to win one of several $50 Amazon gift cards, which we'll raffle among people with excellent participation records in the daily diary portion. Each daily survey will take under 5 minutes to complete and will ask you about experiences you had during that day. We will e-mail you a reminder each day and you'll be able to take the survey from your phone or from any computer. Aside from the chance to earn more credits, you'll help our efforts to understand how emotions happen in 'real life'. And, you'll get learn more about yourself by filling out our brief daily questionnaires. What questions do you have so far? [wait for response]

[NOW, GRAB THE SHEET WITH THE SAMPLE DAILY DIARY QUESTIONS AND PROCEED TO EXPLAIN THE DAILY QUESTIONNAIRES]

Great! We're excited to have you participate in the second part of the study. Your participation will consist of completing very brief questionnaires every day for 14 days, starting tomorrow. Each questionnaire will ask about experiences you had during the day, including daily hassles and your emotions in response to those situations. For example, tomorrow [say the day of the week; e.g., Saturday] when you complete your questionnaire, we will be asking questions about your experiences during that day [say the day of the week again; e.g., Saturday]. If you complete the questionnaire after 12AM, we'd still like you to complete the questionnaire based on your experiences on [say same day of the week as before; e.g., Saturday], even though "today" would technically be [say name of day after, e.g., Sunday]. What questions do you have so far? [wait for participant to respond. If participant has no questions, move on] Ok, great! Now that we've covered that, let's go through one of the questionnaires together, just to give you a preview of the kinds of questions you'll be answering every day.

First, you'll be asked questions about hassles you may have experienced during the day. More specifically, [point out question 1 in the document while you say this] you'll be asked to think about your day, pick the most stressful hassle or event that happened

to you during the day, and select one category that best describes that event or hassle [point to the example categories]. This event can be anything, the only requirement is that it is something that happened to you during that day and that it was the most stressful thing that happened. Does that make sense? [wait for response; if they say no, then provide example events, such as having car trouble, money problems, arguing with someone]

After you choose a category, you'll be asked to describe your most stressful event in 10 words or less, just so we can learn more about exactly what happened to you that day. If on any day you are having trouble remembering hassles that happened to you, we can give you a little extra help. If you choose this last option [point out last in question 1, which reads "I can't remember…"], we'll give you some example events to help you remember your hassles for that day, and then we'll ask you to describe your event in 10 words or less. So, regardless of whether you remember your event right off the bat or prefer to see a few examples, you will be asked to bring a specific stressful event to mind and describe it in 10 words or less. [emphasize this next part] It is <u>really</u> important that you try your best to remember a specific stressful event each day, since the questions that come after will keep asking you about it. It'll be much easier for you to answer those questions with a specific event in mind. What questions so you have so far? [wait for answer].

Awesome! After you choose your most stressful event, you'll be asked to tell us about some of the emotions you felt both during that event and after it happened [point to emotions questions]; you'll use these slider bars to answer the questions. Just move the bar to indicate your answer; for each emotion, the left most part of the slider bar means you didn't feel that emotion at all and the right-most part means you felt it 'extremely' during or after the most stressful event of that day. It's OK if you felt more than one emotion, we just want to understand your experience during each day. Then, after you tell us about your emotions, we'll ask you to answer some questions about how you dealt with that stressful event. Here is one example question [point to question 1 in the emotion regulation strategies questions] and you'll answer it by selecting one of the 5 answer choices. As you probably just saw, what we really want with these questionnaires is to learn more about people's experiences during each day. So, we will <u>really</u> appreciate if you answer all our questions truthfully and complete all 14 questionnaires. On top of these questions I just described, we'll ask you a few more things about your experiences during the day. What questions do you have? [wait for them to answer]

Great. We will send you a reminder e-mail every day at 5PM with a link to complete the questionnaire. The questionnaire will remain available from 5PM until 2AM. At 2:01AM, you will still be able to complete the questionnaire, but we will no longer receive your responses. Completing each questionnaire will take less than 5 minutes and you'll earn more academic credits for completing those. To help you remember to take the surveys, we'd like to send you a text message if we notice you haven't participated in one of our surveys. We'll only ever text you to remind you about our survey if we notice you haven't participated. We'll text you from a lab phone number and no one outside

the lab will have access to your number or information. Could we have the best phone number to text you at? [write down number in participant record form; if they say no, which is unlikely, then say OK]. Also, is your school e-mail address the best one to reach you at? [wait for answer; if they say no, then note the best e-mail address on the participant record form] Thanks! And of course, all your responses to our surveys are completely confidential. Only the lab director and graduate students will have access to those, and we'll remove your name, e-mail and any other identifying information from all your surveys. What questions do you have for us? [wait for response]
Awesome. We are excited to get you started with this next part of the study. We'll send you the first questionnaire tomorrow at 5PM! Please do send us an email if you're having trouble receiving or taking our questionnaires or if you ever want to get in touch with us.

Appendix B

Daily emotion regulation strategies measure

Below is the emotion regulation strategies measure participants will complete every day for 14 days. Text between [] was not presented to participants:
[INSTRUCTION] **Keep in mind the stressful event you're telling us about. Below is a list of ways that people might respond to stress. Tell us the extent to which you responded to your event today in each of these ways.**

1. I calmly reflected on my feelings and how to solve my problems. [Reflection]
2. I avoided the situation or people that led to my feelings. [Behavioral avoidance]
3. I accepted the way I was feeling, without judging myself. [Acceptance]
4. I tried to get rid of negative thoughts, feelings, or sensations. [Experiential avoidance]
5. I put off doing something that needed to get done. [Procrastination]
6. I changed the way I thought about what caused my feelings. [Reappraisal]
7. I couldn't stop thinking about my feelings (how bad I felt, why I felt that way). [Rumination]
8. I talked about my feelings with others. [Social Support]
9. I avoided expressing my feelings. [Suppression]
10. I engaged in activities to distract myself from my feelings. [Distraction]
11. I used alcohol or another substance to change my feelings. [Drug use]
12. I put my emotions into words (e.g., thought to myself "I'm feeling really sad about this") [Affect labeling]

Note. Items 1-11 have been utilized in a previous study (see the project and materials here: https://osf.io/pwy9r/. All items were rated on a 5-point Likert-type scale (*1 = not at all; 2 = a little; 3 = moderately; 4 = very much; 5 = extremely*).

Appendix C

Daily stressor category	% endorsement
1. School (e.g., bad grade, presentation)	34.70
2. Friends (e.g., argument or disagreement, rejection)	7.60
3. Physical health (e.g., illness, injury)	10.10
4. Romantic relationship or dating life (e.g., argument or disagreement, bad date, rejection)	8.30
5. Work (e.g., trouble with co-worker or boss, difficulty doing work	6.90
6. Family (e.g., argument or disagreement)	5.20
7. Home (dorm room or apartment) (e.g., argument or disagreement with roommate(s), issue with RA, issue with landlord)	2.40
8. Other	11.50
9. I can't remember any stressful or unpleasant events, show me a list of common everyday stressors	13.20

Note. % endorsement = % of total sample who endorsed category over the daily diary period.

Appendix D

Emotion	M	*SD*
Anxiety	58.78	30.27
Irritability or anger	28.65	30.60
Sadness	28.58	29.88
Guilt	29.56	33.06

Note. M = average intensity rating for each emotion. *SD* = standard deviation of average intensity scores. Emotion intensity was rated using a slider scale ranging from 0 to 100 with 10-point tick-mark increments. Questions were forced-response, such that participants had to slide the bar to some extent (they could return to zero)

Appendix E

Variables	Daily DT
Reflection	-.47*
Beh avoid	-.74***
Acceptance	-.18
Exp avoid	-.77***
Procrastination	-.41**
Reappraisal	-.57***
Rumination	-.83***
Social support	-.60*
Suppression	-.48
Distraction	-.66***
Drug use	-.36
Affect labeling	-.57**

This table displays between-person associations among average levels of daily DT and emotion regulation strategy use. Daily DT = distress tolerance assessed daily; avoid = behavioral avoidance; Exp avoid = experiential avoidance. * denotes $p < .05$; ** $p < .01$, *** $p < .001$. Higher daily DT across the study period had medium, inverse links with all maladaptive emotion regulation strategies (i.e., behavioral avoidance, experiential avoidance, rumination, distraction, procrastination, suppression, and drug use). Regarding adaptive strategies, greater average daily DT was linked with lower average use of reappraisal, social support, affect labeling, and reflection, with medium effect sizes, and exhibited a small, inverse association with acceptance.

Appendix F

On an exploratory basis, we examined the discriminant validity of DT, relative to conceptually related constructs, with respect to emotion regulation strategy use in daily life. Negative urgency, anxiety sensitivity, experiential avoidance, intolerance of uncertainty, and mindfulness are emotion regulation abilities that are linked empirically with emotion regulation outcomes in similar ways as DT (see King, Feil, & Halvorson, 2018; Vujanovic et al., 2010 for empirical associations with emotion regulation outcomes) (see Baer, Smith, & Allen, 2004; Buhr & Dugas, 2002; Hayes et al., 2004; King, et al., 2018; Reiss, Peterson, Gursky, & McNally, 1986 for definitions of these emotion regulation abilities). Given the overlap between DT and these neighboring clinical traits in terms of their conceptualization and their associations with emotion regulation behaviors, it is important to establish the unique roles (i.e., incremental validity) in predicting emotion regulation behaviors. If DT is in fact a meaningfully separate predictor of emotion regulation strategy use, then we would expect to see an independent effect of DT over and above these related predictors. Thus, we tested whether trait DT, anxiety sensitivity, intolerance of uncertainty, negative urgency, mindfulness, and experiential avoidance would simultaneously predict emotion regulation strategy use in a between-person multiple regression. We also measured anxiety sensitivity and intolerance of uncertainty alongside DT as momentary states because they overlap most strongly with DT on a theoretical basis; these two variables, like DT, capture individuals' *beliefs* regarding their ability to effectively withstand aversive stimuli. Assessing these latter constructs both at baseline and day-to-day

allowed us to compare their effects to DT at the between- and within-person levels of analysis.

The between-person model involved 6 baseline trait predictors: DT, anxiety sensitivity, mindfulness, experiential avoidance, negative urgency, and intolerance of uncertainty. The within-person model involved 3 predictors measured daily: DT, anxiety sensitivity, and intolerance of uncertainty. In this within-person model, we controlled for the day of participation in the study (i.e., 1 through 14) in order to account for linear trends in participants' responses over time. We present the results from our between- and within-person multiple regression analyses in tables F1 and F2, respectively.

Table F1: Between-person Multiple Regression of Emotion Regulation Strategy Use on Baseline Clinical Trait Levels

Outcome	Predictor	*b*	*SE*	*p*	*β*	*β* 95% CI Lower	*β* 95% CI Upper
Reflection	DT	.05	.14	.72	.12	-.55	.79
	AS	-.04	.11	.74	-.07	-.51	.36
	EA	.14	.13	.28	.32	-.23	.87
	IoU	-.14	.14	.31	-.32	-.86	.21
	Mindfulness	.12	.13	.33	.28	-.24	.80
	NU	-.13	.15	.39	-.30	-.96	.36
Beh Avoid	DT	.07	.12	.57	.15	-.39	.68
	AS	.01	.16	.95	.02	-.57	.61
	EA	.26	.15	.08	.53	-.00	1.07
	IoU	-.09	.12	.43	-.19	-.72	.34
	Mindfulness	-.12	.14	.38	-.24	-.70	.22
	NU	-.11	.10	.29	-.23	-.62	.17
Acceptance	DT	.05	.16	.75	.10	-.50	.70
	AS	-.14	.16	.36	-.25	-.78	.27
	EA	.14	.15	.36	.27	-.30	.83
	IoU	.19	.14	.16	-.36	-.80	.08
	Mindfulness	.12	.17	.47	.22	-.36	.80
	NU	-.17	.16	.30	-.33	-.90	.25
Exp Avoid	DT	.06	.13	.65	.13	-.42	.68
	AS	.18	.12	.13	.36	-.11	.83
	EA	.19	.09	.03	.41	.08	.74
	IoU	-.23	.14	.10	-.51	-1.19	.16
	Mindfulness	.13	.11	.22	.29	-.15	.72
	NU	.08	.11	.49	.17	-.29	.62
Procrastination	DT	-.20	.19	.29	-.24	-.66	.18
	AS	-.15	.22	.49	-.16	-.61	.28
	EA	.32	.15	.04	.37	.04	.70
	IoU	-.11	.16	.47	-.13	-.49	.23
	Mindfulness	-.29	.24	.21	-.34	-.82	.15
	NU	-.01	.19	.95	-.02	-.46	.43
Reappraisal	DT	-.02	.09	.77	-.07	-.54	.40
	AS	.27	.10	.01	.69	.20	1.19
	EA	.01	.08	.84	.04	-.36	.44
	IoU	.07	.09	.43	.19	-.28	.65
	Mindfulness	.17	.12	.16	.46	-.16	1.08
	NU	.10	.09	.22	.29	-.21	.79
Rumination	DT	.14	.11	.23	.35	-.24	.93
	AS	.20	.15	.17	.48	-.11	1.06
	EA	.15	.13	.26	.38	-.30	1.06
	IoU	-.06	.09	.48	-.16	-.58	.26
	Mindfulness	-.10	.08	.26	-.24	-.63	.16
	NU	-.04	.09	.66	-.09	-.51	.32
Social support	DT	-.14	.10	.17	-.32	-.76	.12
	AS	.04	.09	.68	.08	-.31	.46
	EA	.13	.07	.09	.29	-.04	.62

	IoU	-.22	.12	.06	-.49	-.88	-.10
	Mindfulness	.31	.09	.00	.70	.25	1.15
	NU	-.18	.10	.06	-.41	-.84	.02
Suppression	DT	.24	.15	.10	.42	-.10	.95
	AS	.20	.14	.14	.32	-.11	.74
	EA	.20	.13	.14	.33	-.10	.76
	IoU	-.17	.13	.20	-.29	-.73	.15
	Mindfulness	-.23	.12	.05	-.38	-.73	-.03
	NU	-.11	.15	.48	-.19	-.72	.35
Distraction	DT	.35	.14	.01	.54	.053	1.03
	AS	.19	.17	.26	.27	-.216	.75
	EA	.42	.11	.00	.62	.333	.91
	IoU	-.25	.14	.08	-.37	-.771	.03
	Mindfulness	-.08	.19	.68	-.11	-.637	.41
	NU	-.25	.15	.09	-.38	-.871	.10
Drug use	DT	.09	.08	.26	.48	-.247	1.20
	AS	.07	.08	.39	.32	-.313	.95
	EA	-.05	.06	.43	-.25	-.816	.32
	IoU	-.03	.05	.54	-.16	-.711	.38
	Mindfulness	-.02	.06	.73	-.10	-.679	.48
	NU	-.05	.07	.51	-.25	-1.004	.50
Affect labeling	DT	-.07	.16	.66	-.12	-.650	.41
	AS	.23	.14	.12	.36	-.153	.87
	EA	.17	.08	.04	.28	.006	.56
	IoU	-.28	.14	.05	-.47	-.844	-.10
	Mindfulness	.31	.14	.02	.51	.058	.97
	NU	-.08	.13	.53	-.14	-.588	.30

Note. *b* = unstandardized regression coefficient; *SE* = standard error of *b*; CI Lower = lower bound of 95% confidence interval for *β*; CI Upper = upper bound of 95% confidence interval for *β*; *β* = standardized regression coefficient; DT = distress tolerance; AS = anxiety sensitivity; EA = experiential avoidance; IoU = intolerance of uncertainty; NU = negative urgency; Beh avoid = behavioral avoidance; Exp avoid = experiential avoidance.

Table F2: Within-person Multiple Regression of Emotion Regulation Strategy Use on Daily Clinical Trait Levels

Outcome	Predictor	*b*	*SE*	*p*	*β*	*β* 95% CI Lower	*β* 95% CI Upper
Reflection	Day	-.01	.02	.606	-.04	-.18	.11
	DT	.01	.01	.247	.08	-.06	.23
	AS	-.08	.04	.060	-.18	-.34	-.01
	IoU	.01	.02	.664	.03	-.12	.18
Beh Avoid	Day	-.01	.02	.522	-.05	-.19	.09
	DT	-.00	.01	.672	-.03	-.16	.11
	AS	-.06	.03	.072	-.12	-.26	.02
	IoU	.03	.02	.070	.14	-.01	.29
Acceptance	Day	-.05	.02	.003	-.21	-.34	-.08
	DT	.03	.01	.001	.18	.08	.28
	AS	-.01	.05	.091	-.01	-.19	.17
	IoU	-.04	.02	.033	-.16	-.31	-.01
Exp Avoid	Day	-.03	.01	.036	-.13	-.25	-.01
	DT	.01	.01	.139	.06	-.02	.14
	AS	-.00	.01	.941	-.00	-.08	.07
	IoU	.03	.02	.132	.12	-.04	.28
Procrastination	Day	-.01	.02	.424	-.05	-.17	.07
	DT	-.02	.01	.136	-.10	-.23	.02
	AS	.04	.03	.293	.07	-.07	.20
	IoU	.02	.02	.319	.07	-.07	.22
Reappraisal	Day	.02	.01	.130	.10	-.02	.22
	DT	.02	.01	.001	.16	.07	.25
	AS	-.01	.03	.818	-.02	-.16	.13
	IoU	-.01	.01	.362	-.05	-.15	.06
Rumination	Day	-.01	.01	.322	-.05	-.15	.05
	DT	-.04	.01	.000	-.25	-.37	-.13
	AS	.06	.01	.000	.11	.03	.20
	IoU	.06	.01	.000	.23	.10	.37
Social support	Day	-.02	.02	.322	-.07	-.20	.07
	DT	-.01	.02	.565	-.06	-.25	.13
	AS	-.09	.03	.005	-.16	-.30	-.02
	IoU	.05	.02	.005	.20	.08	.31
Suppression	Day	-.02	.02	.356	-.06	-.19	.07
	DT	.01	.01	.456	.05	-.09	.19
	AS	.08	.02	.000	.15	.04	.25
	IoU	-.00	.02	.919	-.01	-.17	.16
Distraction	Day	-.04	.01	.005	-.15	-.24	-.05
	DT	.01	.01	.472	.05	-.09	.19
	AS	-.00	.03	.891	-.01	-.11	.09
	IoU	.04	.02	.061	.16	-.00	.33
Drug use	Day	.00	.01	.592	.03	-.08	.15
	DT	-.0	.00	.234	-.06	-.16	.04
	AS	-.03	.02	.131	-.09	-.23	.04
	IoU	.00	.01	.511	-.04	-.07	.15

Affect labeling	Day	-.01	.02	.491	-.05	.20	.10
	DT	-.02	.01	.044	-.10	-.19	-.00
	AS	-.02	.03	.352	-.05	-.16	.06
	IoU	.01	.02	.458	.05	-.08	.19

Note. *b* = unstandardized regression coefficient; *SE* = standard error of *b*; CI Lower = lower bound of 95% confidence interval for *β*; CI Upper = upper bound of 95% confidence interval for *β*; *β* = standardized regression coefficient; DT = distress tolerance; AS = anxiety sensitivity; IoU = intolerance of uncertainty; Beh avoid = behavioral avoidance; Exp avoid = experiential avoidance.

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Footnotes

[1] In registered report submissions, authors submit a study proposal to a journal, which evaluates it based on study design, relevance of the proposed study question, and data analytic plan (see Chambers, 2013; Nosek & Lakens, 2016, for more details). During this initial round of peer review, if the journal deems that the study is relevant and well-designed, they may grant authors an in-principle acceptance (IPA), thereby committing to publish the results regardless of the study findings. Authors granted IPA go on to conduct the proposed study and submit their findings and discussion to the journal.