Experimental Manipulation of Emotion Regulation Self-Efficacy: Effects on Emotion Regulation Ability, Perceived Effort in the Service of Regulation, and Affective Reactivity

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Abstract

Deficits in emotion regulation self-efficacy (Tamir & Mauss, 2011) may be a risk factor for psychological distress. The present study sought to test the hypothesis that participants who were led to believe that emotion regulation self-efficacy was enhanced (expected success condition: \( n = 34 \)), versus those in a control condition (\( n = 36 \)), would report relatively less negative affective reactivity in response to a negative mood induction. Additionally, we hypothesized that those in the expected success condition would perform better than those in the control condition on an emotion regulation task. As predicted, those in the expected success condition reported less negative affective reactivity compared to control participants, but no difference was observed between groups on the emotion regulation task. Thus, a one-session manipulation of emotion regulation self-efficacy appears to directly influence self-reported affective reactivity, but not an individual’s emotion regulation ability.

*Keywords:* emotion regulation self-efficacy; emotion regulation; efficacy; experimental; affect; reactivity.
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According to Tamir & Mauss (2011), the social cognitive theory of emotion regulation suggests that to successfully regulate a negative emotional experience one must (a) first believe that he or she is capable of changing his or her current emotional state (i.e., emotion regulation self-efficacy), (b) have established outcomes that he or she is trying to achieve (e.g., improved mood), and (c) have established strategies or behaviors to implement in order to achieve the desired goal. Although self-efficacy beliefs appear to be a precondition to successful regulation, much of the existing research in this area has focused on emotion regulation goals and strategies, while paying relatively little attention to emotion regulation self-efficacy. Moreover, few studies have explicitly examined how emotion regulation self-efficacy is associated with emotion regulation ability (Bandura, Caprara, Barbaranelli, Gerbino, & Pastorelli, 2003; Caprara et al., 2008). Given the increasing focus on emotion regulation in the etiology of psychopathology (see Aldao, Nolen-Hoeksema, & Schweizer, 2010 for a review), it is important to understand how emotion regulation self-efficacy and emotion regulation ability are related, and how these constructs relate to psychological well-being.

Measures that ask participants to evaluate their ability to alter their emotional experience (e.g., “When I’m upset, I believe there is nothing I can do to make myself feel better”; Difficulties in Emotion Regulation Scale—Strategies [DERS-Strategies] subscale, Gratz & Roemer, 2004) assess emotion regulation self-efficacy (e.g., DERS-Strategies, Gratz & Roemer, 2004; Negative Mood Regulation Scale, Catanzaro & Mearns, 1990). Although self-report measures of emotion regulation can be differentiated from measures of emotion regulation self-efficacy by the degree to which the evaluation of perceived success is removed from item
content (e.g., “When I feel negative emotions, I make sure not to express them”; Gross & John, 2003), other assessment methods (e.g., behavioral tasks [Gratz, Rosenthal, Tull, Lejuez, & Gunderson, 2006]; neuroimaging [Goldin, McRae, Ramel, & Gross, 2008; Ochsner & Gross, 2008]) may be especially useful in differentiating between perceived and actual ability.

Cross-sectional study designs are the primary approach used to examine the relationship between emotion regulation self-efficacy and psychological outcomes. In these cross-sectional studies, emotion regulation self-efficacy has been shown to be uniquely associated, above and beyond the effects of other established risk factors, with a variety of maladaptive outcomes (e.g., perceived stress [Mehrotra & Tripathi, 2012], posttraumatic stress disorder diagnostic status, [DiMauro, Renshaw, & Kashdan, 2016], depressive symptoms [Catanzaro et al., 2014], borderline personality disorder symptoms [Salsman & Linehan, 2012]; binge eating symptoms [Whiteside et al., 2007]), such that lower levels of self-efficacy are associated with greater psychological distress. Additionally, emotion regulation self-efficacy has been shown to interact with established risk factors (e.g., experiential avoidance, anxiety sensitivity) to predict maladaptive psychological outcomes (e.g., depression, anxiety, stress), such that those with lower emotion regulation self-efficacy confer higher risk for maladaptive psychological outcomes (Fergus, Bardeen, & Orcutt, 2013; Kashdan, Zvolensky, & McLeish, 2008).

Some longitudinal evidence supports the proposition from Tamir and Mauss (2011) that emotion regulation self-efficacy precedes regulatory behavior and psychological outcomes. For example, Mearns (1991) found that lower emotion regulation self-efficacy prospectively predicted greater depressive symptoms following a distressing event (i.e., termination of a romantic relationship), as well as attempts to regulate event-related distress. In another study, Kassel, Bornovalova, and Mehta (2007) found that lower emotion regulation self-efficacy
predicted greater anxiety and depression symptom change among undergraduate students over the course of eight weeks, even after controlling for general distress and regulatory styles (i.e., participants were categorized based on the strategies that they most frequently employed to alleviate their emotional distress [e.g., avoidant, problem-focused, social support seeking]). Similar associations have been identified over the span of one and two years (Bandura et al., 2003; Davis, Andresen, Trosko, Massman, & Lovejoy, 2005). Taken together, these findings suggest that emotion regulation self-efficacy may play a causal role in the development of psychological distress.

Although preliminary prospective evidence regarding the association between emotion regulation self-efficacy and psychological outcomes is promising, the majority of research on emotion regulation self-efficacy is cross-sectional and fails to consider how specifically emotion regulation self-efficacy alters psychological outcomes. As Bigman, Mauss, Gross, and Tamir (2016) point out, there are three possibilities: (a) individuals who are psychologically healthy tend to report more positive emotions overall, including their expectancies about emotion regulation, (b) individuals who are better at regulating their emotions come to expect themselves to be more successful; thus, more experiences with successful emotion regulation ability leads to increased emotion regulation self-efficacy, or (c) an individual’s expectancy of his or her ability to regulate emotions influences the degree to which they effectively do so.

In the only known study to attempt to experimentally manipulate emotion regulation self-efficacy, Bigman et al. (2016) investigated these possibilities. Specifically, Bigman et al. (2016) manipulated emotion regulation self-efficacy in a sample of 41 undergraduates by convincing participants in the expected success condition that a placebo pill would enhance emotional control. Bigman et al. (2016) employed a manipulation check in which participants were asked to
list side effects of the pill they had taken. Participants who failed to identify the side effects of the pill were not included in the final sample. Compared to participants in the control group ($n = 19$), participants in the expected success condition ($n = 22$) reported less negative affective change after viewing an emotionally evocative film clip. Although the expected success and control conditions did not differ in self-reported attempts to regulate emotions, the expected success group reported more success at regulating emotions. It stands to reason that the manipulation had one of the following effects on participants in the expected success condition: (a) participants were led to believe that they would have some enhanced emotional ability, and thus, reported emotional reactivity that was consistent with this expectation, or (b) the lack of between-group differences in self-reported attempts to regulate emotions was not reflective of what was actually happening; individuals in the expected success condition put forth more effort than the control participants to regulate their emotions. This may seem counterintuitive, but some evidence suggests that emotion regulation sometimes occurs outside of conscious awareness (see Gross, 2015). As noted by Bigman et al. (2016), it will be necessary to use an objective measure of emotion regulation to determine whether manipulating emotion regulation self-efficacy actually results in differences in emotion regulation ability.

An objective assessment of emotion regulation ability (e.g., pursuit of goal-relevant behavior while experiencing emotional distress) was used in the present study to determine whether enhancing emotion regulation self-efficacy leads to actual increases in regulatory ability rather than simply affecting self-reports of distress. We utilized the procedure outlined by Bigman et al. (2016) with several modifications, including use of a validated measure of affect, assessment of baseline emotion regulation self-efficacy to account for any between-group differences before the manipulation occurred, and use of a previously validated negative mood
manipulation procedure (Bardeen, 2015; Bardeen & Orcutt, 2011; Pretz, Totz, & Kaufman, 2010). Most importantly, the computerized Mirror Tracing Persistence (MTPT-C) task was used as a measure of emotion regulation ability, while simultaneously inducing emotional distress (Gratz et al., 2006). The addition of a measure of emotion regulation ability helps to address a significant gap in the literature. That is, it is clear that relatively lower levels of emotion regulation self-efficacy are associated with emotional distress and maladaptive psychological outcomes (e.g., Catanzaro et al., 2014; DiMauro et al., 2016; Mehrotra & Tripathi, 2012; Whiteside et al., 2007), but it is not clear how emotion regulation self-efficacy is related to these outcomes (i.e., possibly through increased emotion regulation ability).

Consistent with Bigman et al. (2016), we hypothesized that the expected success condition would report less negative affective reactivity compared to the control condition after the distress inducing task (i.e., MTPT-C; Hypothesis 1), participants in the expected success condition would rate their emotion regulation success higher than participants in the control condition (Hypothesis 2), and there would not be group differences in reported regulation efforts (Hypothesis 3). Consistent with the social cognitive theory of emotion regulation (Tamir & Mauss, 2011), we hypothesized that individuals in the expected success condition would exhibit enhanced emotion regulation ability, as measured by the behavioral task, compared to control participants (Hypothesis 4). Moreover, performance on the behavioral task was expected to partially explain the association between the manipulation and self-reported negative affective reactivity (Hypothesis 5).

Methods

Participants
Participants were recruited from a southeastern university via an online recruitment system. To be eligible, participants were required to be between the ages of 18-64 and have no self-reported vision or motor problems that would affect task completion (e.g., able to view and respond via computer mouse to images on a screen). Six participants were removed from the sample because: one participant did not complete the manipulation, three participants in the expected success condition did not pass the manipulation check (described below), and two participants correctly identified the pill as a placebo when probed for suspicion. Additionally, three outliers were removed for having undue influence on the primary analytic models (identified via a two-pronged multivariate approach; Aguinis & Joo, 2015).

The final sample \( (N = 70) \) was largely female \( (n = 54; 77.1\%) \) with an average age of 18.8 \( (SD = 0.96, \text{range: } 18-22) \). In regard to race, 87.1\% of the sample self-identified as White, 7.1\% as Black, and 5.7\% as Asian. Additionally, 4.3\% of the sample identified their ethnicity as Hispanic. Forty-seven percent of this university student sample reported an annual household income between $40,000 and $124,999, 39\% reported an annual income of $125,000 or greater, and 14\% reported an annual income of $39,999 or less. Half of the sample \( (n = 35) \) reported being employed at least part-time.

**Self-report measures**

**Positive and Negative Affect Schedule-Negative Affect subscale.** The Negative Affect (NA) Subscale of the Positive and Negative Affect Schedule (the PANAS; Watson, Clark, & Tellegen, 1988) served as the measure of self-reported negative affect in the present study. Items are scored on a 1 (very slightly or not at all) to 5 (extremely) scale. The PANAS-NA subscale is sensitive to within-session mood inductions, such as the one presented in the current study (Rusting & Larsen, 1997; Schneider, Gur, Gur, & Muenz, 1994). The PANAS-NA subscale has
demonstrated adequate internal consistency (Koff & Lucas, 2011; Odou & Brinker, 2015; Watson et al., 1988) and strong criterion-related validity (Crawford & Henry, 2004). In the present sample, internal consistency of the PANAS-NA subscale was acceptable at all three time points (α ranging from .79 - .85).

**Difficulties in Emotion Regulation Scale-Strategies subscale.** The Difficulties in Emotion Regulation Scale-Strategies subscale (DERS-Strategies; Gratz & Roemer, 2004) consists of eight items that assess perceived ability to successfully regulate negative emotions (e.g., “When I’m upset, I believe that there is nothing I can do to make myself feel better”). Items are rated on a scale from 1 (almost never) to 5 (almost always), with higher scores indicating lower emotion regulation self-efficacy. The DERS-Strategies subscale has exhibited adequate psychometric properties, including internal consistency and construct validity (Coffey, Hartman, & Fredrickson, 2010; Gratz & Roemer, 2004). Internal consistency of the DERS-Strategies subscale was adequate in the present sample (α = .91).

**Laboratory tasks**

**Negative mood induction.** Forty negatively valenced emotional stimuli (e.g., man with gun, bloody hand, plane crash) from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 2005) were used to induce negative affect (negative valence and high arousal: $M = 2.17$ and 6.52, respectively; Bardeen, 2015). These images were originally rated on 9-point rating scales to provide norm-references for valence and arousal (Lang et al., 2005). Image sets with similar valence and arousal have been used to induce negative affect, as measured by the PANAS (Pretz et al., 2010). In line with the mood induction procedure from Pretz et al. (2010), negative images were shown for five seconds each, with a 1.5s pause between images. To ensure that participants looked at the images, participants were told that they would
later be tasked with recognizing some images from this portion of the study. This also served to enhance the narrative that the purpose of the study was to examine the effects of a new medication on memory.

**Emotion regulation task.** The Mirror Tracing Persistence Task (MTPT-C; Strong et al., 2003) was used to assess participants’ ability to regulate emotions. The MTPT-C has been used as a behavioral measure of emotion regulation in previous research (Bornovalova et al., 2008). Evidence of construct validity has been provided by research showing that scores on the MTPT-C are associated with other measures of emotion regulation (Daughters et al., 2005; Lejuez, Kahler, & Brown, 2003), as well as emotion regulation-related constructs (e.g., dysphoria, borderline personality symptoms; Bornovalova et al., 2008; Ellis, Fischer, & Beevers, 2010).

For the MTPT-C, participants use the computer mouse to trace a red dot as it travels along the lines of a shape (e.g., star). However, the dot moves in the reverse direction of the mouse, making the task difficult and inducing negative affect. A deviation from the line of the shape, or a pause of more than two seconds, results in a loud explosion sound, and the red dot returns to the starting position. Participants complete two “levels” that end after 60 seconds. Participants have up to seven minutes to trace the third shape, but they are not told about the time limit. Participants receive instructions that they can end the third level at any point by pressing the “QUIT” button. Emotion regulation (i.e., the ability to pursue goal relevant behavior while experiencing emotional distress) is measured by the latency to quit the task, with longer time to quit being indicative of better emotion regulation ability. The task is titrated for difficulty, such that all participants experience a similar level of difficulty, despite differences in skill.

**Procedure**
Study procedures were approved by the local Institutional Review Board prior to data collection. Participants completed informed consent before being randomly assigned to one of two conditions: the expected success ($n = 34$) or control ($n = 36$) condition. Participants were told that the purpose of the study was to examine the effects of a safe drug, Anahance, on memory. Participants completed baseline (Time 1 [T1]) measures of affect (the PANAS) and emotion regulation self-efficacy (DERS-Strategies). Next, participants completed the negative affect induction procedure (Bardeen, 2015; Pretz et al., 2010). Participants were told to pay attention to the images on the screen (i.e., IAPS images; Lang et al., 2005), as they would later be asked to remember some of the images.

After the negative affect induction procedure, participants completed a second assessment of affect (Time 2 [T2]) followed by placebo drug administration. Participants were told that dry mouth is a known side effect of Anahance. Additionally, participants in the expected success condition were told that enhanced emotional control is another known side effect of the drug. As a manipulation check, all participants were asked to describe potential side effects (i.e., “Please list any and all side effects of the pill, as were just described to you”). Next, participants performed the emotion regulation task (MTPT-C), followed by another measure of affect (Time 3 [T3]). To increase motivation, participants were told that they would receive $5 if their performance on the MTPT-C was above average (Lejuez et al., 2003). Regardless of performance, all participants received $5 as compensation for their participation. After completing the MTPT-C, participants were asked how well they thought they were able to regulate their emotions during the task (i.e., “To what extent were you successful at minimizing your emotional reactions during the task?”) and how hard they tried to adhere to the task despite frustration (i.e., “To what extent were you trying to persist in the task despite frustration?”). Both
questions were rated on a 7-point scale (not at all to extremely). To maintain the cover story, participants viewed a series of ten negatively valenced IAPS images (Lang et al., 2005) and were asked to identify which images had previously been shown. Finally, participants were probed for suspicion (e.g., “What was this study about?”) and provided with a limited debriefing to maintain fidelity of the manipulation for future participants. Once data collection was completed, an in-depth debriefing letter was sent to participants via e-mail.

Data analytic plan

**Preliminary analyses.** Demographic variables (e.g., age, sex, race/ethnicity) were examined. Means, standard deviations, and bivariate correlations were calculated in order to better understand the association between descriptive statistics and variables of interest. Examination of bivariate correlations aided in the identification of potential covariates. Identified covariates (i.e., age and sex, see Results) were entered into all subsequent analyses. A series of ANCOVAs were conducted to examine baseline differences between participants in the expected success and control conditions in regard to baseline negative affect, emotion regulation self-efficacy, and baseline affective reactivity from T1 to T2. Baseline affective reactivity was calculated as the standardized residual score produced by regressing T2 NA on T1 NA. Standardized residual change scores are described as a “base-free” measure of change that is superior to simple difference scores (Cronbach & Furby, 1970; Gratz, Bardeen, Levy, Dixon-Gordon, & Tull, 2015; Tucker, Damarin, & Messick, 1966).

**Primary analyses.** An ANCOVA was conducted to assess the hypothesis (Hypothesis 1) that those in the expected success condition would report less negative affective reactivity following administration of the placebo pill and completion of the distressing task (i.e., the MTPT-C). Condition served as the independent variable in the model and the residual change
score in NA from T1 to T3 (i.e., baseline affective reactivity) served as the dependent variable. To test the hypothesis that those in the expected success condition would report enhanced emotion regulation abilities, compared to those in the control condition (Hypothesis 2), an ANCOVA was conducted in which self-reported emotion regulation ability during the MTPT-C served as the dependent variable and condition served as the independent variable. Similarly, to test Hypothesis 3, an ANCOVA was conducted in which self-reported emotion regulation attempt served as the dependent variable and condition served as the independent variable. Emotion regulation self-efficacy (i.e., DERS-Strategies) was included as a covariate in both models. To test the hypothesis that those in the expected success condition would perform better on the emotion regulation task (Hypothesis 4), an ANCOVA was conducted in which latency to quit (in seconds) on the MTPT-C served as the dependent variable and condition served as the independent variable. Finally, a mediation analysis was conducted using the PROCESS plug-in for SPSS (Hayes, 2012) to test the hypothesis that latency to quit the MTPT-C would mediate the association between condition and post-manipulation affective reactivity (Hypothesis 5). As seen in Figure 1, latency to quit on the MTPT-C (in seconds) was entered into the model as the mediating variable (M) between condition (X) and residual change score from NA T1 to T3 as the dependent variable (Y). Bootstrapped samples (5000 samples) were estimated as outlined by Hayes (2009).

**Results**

**Preliminary analyses**

Age was significantly associated with emotion regulation self-efficacy (i.e., DERS-Strategies; \( r = .31, p = .008 \)) and negative affect at T2 (T2 NA; \( r = .32, p = .005 \)). Specifically, older participants reported less emotion regulation self-efficacy and greater T2 NA. Additionally,
the associations between sex and T1 NA and sex \((r = -.23, p = .056)\) and minimizing distress during the task \((r = -.23, p = .055)\) both approached significance. The association between sex and T3 NA \((r = -.37, p = .001)\) was statistically significant. Specifically, males reported higher NA at T1 and T3, and greater attempts to minimize their distress during the MTPT-C. As such, sex and age were included as covariates in all subsequent analyses. As expected, there were no differences between groups in baseline negative affect (T1 NA; \(F[1,66] = .09, p = .768\)), emotion regulation self-efficacy (DERS-Strategies; \(F[1,669] = .37, p = .544\)), or baseline affective reactivity from T1 NA to T2 NA \((F[1,66] = .63, p = .432)\).

**Primary analyses**

**Hypothesis 1.** Results of an ANCOVA were significant \((F[1,66] = 4.78, p = .032, \eta^2 = .03)\), such that those in the expected success condition reported less negative reactivity compared to participants in the control condition. The mean T1 PANAS-NA subscale score for those in the expected success condition was 14.35 \((SD = 5.48)\) and 13.16 \((SD = 2.97)\) for those in the control condition. The mean T3 PANAS-NA subscale score for those in the expected success condition was 15.15 \((SD = 3.95)\) and 15.97 \((SD = 4.64)\) for those in the control condition.

**Hypotheses 2 and 3.** After controlling for covariates (i.e., baseline emotion regulation self-efficacy, sex, and age), there was not a significant difference in self-reported success at regulating emotions during the MTPT-C between those in the expected success \((M = 3.35, SD = 1.65)\) and control \((M = 3.56, SD = 1.52)\) conditions \((F[1, 65] = .11, p = .741, \eta^2 = .00)\). In addition, there were no significant differences between the expected success \((M = 3.41, SD = 1.76)\) and control conditions \((M = 3.50, SD = 1.84)\) in self-reported efforts to persist in the task despite distress, controlling for baseline emotion regulation self-efficacy, age, and sex \((F[1, 65] = .11, p = .742, \eta^2 = .00)\).
**Hypothesis 4.** The primary outcome of interest was latency to quit (in seconds) from the MTPT-C. There was considerable variability in participants’ persistence on the task across groups (range: 1.53 - 420.00s; $M = 126.51$ [$SD = 109.24$], $Mdn = 96.79$). There was not a significant difference between the expected success ($M = 124.10$, $SD = 107.10$) and control conditions ($M = 128.80$, $SD = 112.73$) in latency to quit the task ($F[1, 66] = .003$, $p = .960$ $\eta^2 = .00$).

**Hypothesis 5.** Results of the mediation analysis indicated that the effects of condition on latency to quit the MTPT-C (path $a; b = 0.39$, $p = .99$), and latency to quit the MTPT-C on post-manipulation affective reactivity (path $b; b = 0.00$, $p = .79$) were not significant. The total effect of condition on post-manipulation affective reactivity was marginally significant ($b = -0.42$, $p = .057$), and the strength of the association remained after accounting for the mediator ($b = -0.37$, $p = .083$). Finally, the indirect effect was not significant ($b = 0.0001$, 95% CI = -.058, .069). Taken together, results indicate there was a relationship between condition and post-manipulation affective reactivity that was not explained by performance on the MTPT-C.

**Discussion**

In the current study, the temporal relations between emotion regulation self-efficacy, negative affect, and emotion regulation ability were examined via an experimental paradigm. Consistent with results from Bigman et al. (2016), those in the expected success condition (i.e., enhanced emotion regulation self-efficacy) reported significantly less negative affect reactivity compared to those in the control condition. However, enhanced emotion regulation self-efficacy does not appear to have influenced emotion regulation ability, as measured via an objective behavioral task. Furthermore, it does not appear that the relationship between emotion regulation self-efficacy and negative affective reactivity is explained by emotion regulation ability.
Additionally, participants across conditions did not differ in self-reported attempts to regulate emotions during the distressing task, suggesting that those who expected to have enhanced emotional control did not actively attempt to regulate their internal states more than those in the control condition. Thus, based on both behavioral and self-report data from this study, it does not appear that enhanced emotion regulation self-efficacy altered emotion regulation effort or ability. The current study is the only study, to our knowledge, that has directly assessed whether emotion regulation self-efficacy influences emotion regulation ability.

One explanation of the causal associations between variables of interest is that emotion regulation self-efficacy directly influences psychological outcomes, which is consistent with the present findings that a one-session manipulation of emotion regulation self-efficacy was sufficient to change participants’ self-reported negative affective reactivity. This is also consistent with previous experimental and longitudinal research (Bandura et al., 2003; Bigman et al., 2016; Davis et al., 2005). It is possible that emotion regulation self-efficacy precedes subjective psychological experience and associated maladaptive behaviors in the temporal relations among these constructs.

Another possibility is that those with better emotion regulation ability are more likely to expect themselves to be better at regulating their emotions (i.e., have higher emotion regulation self-efficacy as a function of actual ability). Thus, actual ability would predict emotion regulation self-efficacy and related psychological outcomes. While the experimental nature of the current study suggests that emotion regulation self-efficacy precedes self-reported negative affective reactivity in this temporal chain, it does not allow us to determine whether emotion regulation ability precedes emotion regulation self-efficacy.
Alternatively, it is possible that emotion regulation self-efficacy first acts on short-term affective experience, much like a placebo effect, as was observed in the current study. That is, manipulation of the belief that one is better able to manage emotional states leads to less negative affective reactivity. Although study findings provide an important step toward better understanding the temporal relations among these constructs, the current study is unable to speak to the stability of this effect. It seems plausible that enhancing emotion regulation self-efficacy can lead to reduced self-reported negative affective reactivity in the short-term, which in turn, may result in the enhancement of objective emotion regulation abilities over time (e.g., through vicarious learning). For example, an individual with social anxiety who believes herself able to alleviate the emotional distress she experiences in social situations (high self-efficacy) may feel less anxious, compared to someone with low expectancies about her ability to engage in successful social interactions, in a social context. Subsequently, she may evaluate that she was not anxious in the social situation and is more likely to engage in behaviors (e.g., attending social functions and interacting with others) that enhance her regulatory behaviors and reduce her symptoms of social anxiety over time, therefore confirming her beliefs that she is able to manage her anxiety in social contexts. Longitudinal research that follows changes in individuals’ levels of emotion regulation self-efficacy, emotion regulation ability, and psychological outcomes (e.g., affective reactivity, general psychological distress) is needed to elucidate if and how the reciprocal relationship between emotion regulation self-efficacy and emotion regulation ability affects long-term psychological outcomes.

Treatments that focus on emotion regulation skill building, such as dialectical behavioral therapy (DBT; Linehan, 1987) have been shown to result in increased emotion regulation self-efficacy (Keuthen et al., 2010). However, it is unclear whether it is skill acquisition, or
individuals’ expectations about their emotion regulation abilities after training (i.e., emotion regulation self-efficacy), that is the active component of the treatment. Results from this study suggest that enhancing individuals’ beliefs about their ability to successfully regulate their emotions may improve psychological well-being. This is consistent with previous research that demonstrated DBT is particularly helpful for individuals struggling with low emotion regulation self-efficacy (Keuthen et al., 2010). Future research should assess how emotion regulation self-efficacy, emotion regulation ability, and psychological outcomes change throughout the course of DBT and other treatments in which emotion regulation skill acquisition is central. It may be that changes in emotion regulation self-efficacy precede skill acquisition and decreased psychological distress.

Study limitations must be acknowledged. The present sample consisted solely of undergraduate students, a majority of whom where female and White. Some evidence suggests that there may be differences in emotion regulation and emotion regulation self-efficacy in males and females as well as racial and ethnic differences (Bardeen & Stevens, 2015; Nolen-Hoeksema, 2012; Nolen-Hoeksema & Aldao, 2011). Due to a limited number of males ($n = 16$) and individuals who identified their race/ethnicity as other than White and non-Hispanic ($n = 9$) in the current sample, the effects of sex and race/ethnicity could not be examined. Thus, future studies should aim to recruit a more diverse sample in order to generalize findings and examine potential ethnoracial and sex effects. Additionally, the current sample was limited in that it was not a clinical sample. Emotion regulation is often examined in the context of psychopathology (Aldao et al., 2010; Sheppes, Suri, & Gross, 2015; Werner & Gross, 2010), and therefore, it will be important to replicate study findings in a clinical sample. Additionally, it may be important to examine the degree to which emotion regulation self-efficacy is influenced by beliefs about the
malleability of emotions in general in future research (i.e., implicit theories of emotion; Tamir & Mauss, 2011), as some evidence suggests a fixed (versus malleable) view of emotions is associated with a variety of maladaptive outcomes (Tamir, John, Srivastava, & Gross, 2007).

Although a one-session manipulation of emotion regulation self-efficacy may not have been sufficient to induce behavioral change, it was sufficient to alter self-reported negative affective reactivity. The experimental design in this study allows for isolation of emotion regulation self-efficacy as an important causal predictor of self-reported affective reactivity. Extrapolating from the current findings, it appears that emotion regulation self-efficacy may be important in understanding the pathogenesis of psychopathology. However, the current study is limited in its ability to assess whether manipulation of emotion regulation self-efficacy influences emotion regulation ability over time, with repeated practice utilizing emotion regulation skills. Examining the relations between emotion regulation self-efficacy, emotion regulation ability, and psychological outcomes over time is warranted.

An additional explanation for study findings is that participants may not have clearly understood the relationship between enhanced emotional control and success in the task, as they were not explicitly told that inhibiting distress would help them persist longer at the MTPT-C. Tamir and Bigman (2018) postulate that expectations about emotions influence behavior through emotion states, but only when the link between emotion and behavior is explicitly linked. Explicit instructions to minimize negative emotions during the MTPT-C may have resulted in larger effects and a between-groups difference on our behavioral measure of emotion regulation ability. Furthermore, although consistent with other procedures using similar tasks (Lejuez et al., 2003), the potential reward of $5 may have been insufficient to motivate participants to persist despite experiencing emotional distress, making it a less relevant goal.
It is important to consider that the design of the study did not allow use to fully assess how well the participants in the expected success condition internalized the emotion regulation side effect. Although only participants who noted the appropriate side effects were included, it does not necessarily follow that they believed themselves to be better at regulating emotions as a result of consuming the pill. Assessment of perceived emotion regulation self-efficacy as a result of the manipulation should be assessed in future research. Finally, the MTPT-C is sometimes used to assess constructs that are strongly related to emotion regulation (e.g., distress tolerance; Daughters et al., 2008, McHugh et al., 2011). Use of other objective assessments of emotion regulation ability (e.g., Paced Auditory Serial Addition Task, Lejuez et al., 2003) would improve generalizability of findings from this study. While the use of the MTPT-C is part of the novelty of the current design, the incorporation of ecological assessments of emotion regulation and affect (e.g., ecological momentary assessments) would bolster external validity of the results of the present study. This is especially important given that emotion regulation is a polysemous construct. At the present time, it would be impossible to use a measure of emotion regulation that satisfies the many definitions of emotion regulation that are widely used in the extant literature. Thus, incorporating several measures of emotion regulation into future studies is recommended in order to ensure that study findings are robust across measures of emotion regulation.

This study was the first to examine objectively assessed emotion regulation ability as a mediator of the relationship between emotion regulation self-efficacy and affective reactivity using an experimental paradigm. Results indicated that a one-session manipulation of emotion regulation self-efficacy influenced self-reported affective reactivity, but not emotion regulation ability. Additionally, emotion regulation ability did not mediate the relationship between emotion regulation self-efficacy and affective reactivity. Therefore, results from this study
support existing literature highlighting the importance of social cognitive factors in psychopathology (Tamir & Bigman, 2018; Tamir & Mauss, 2011), as well as existing literature that suggests emotion regulation self-efficacy predicts psychological well-being.
References


Figure 1. Proposed mediation model.