

Experimental manipulation of emotion regulation self-efficacy: Effects on emotion regulation ability, perceived effort in the service of regulation, and affective reactivity

by

Natasha Benfer

A thesis submitted to the Graduate Faculty of
Auburn University
in partial fulfillment of the
requirements for the Degree of
Master of Science

Auburn, Alabama
December 16, 2017

Approved by

Joseph R. Bardeen, Chair, Assistant Professor, Department of Psychology
Christopher Correia, Professor, Department of Psychology
Tracy Witte, Associate Professor, Department of Psychology

Abstract

Emotion regulation self-efficacy (Tamir & Mauss, 2011) is a construct of interest that may be prospectively linked to psychological distress. The present study sought to a) replicate findings in which enhanced emotion regulation self-efficacy was associated with less negative affective reactivity in response to a laboratory stressor (Bigman et al., 2016) and b) examine how a manipulation of emotion regulation self-efficacy influences the regulation of emotion as measured via an objective measure. In the present study's relatively small sample ($N = 70$), evidence supported replication of Bigman et al. (2016)'s findings, such that those who believed they had enhanced emotional control reported less negative affective reactivity. However, manipulation of emotion regulation self-efficacy did not appear to influence performance on a behavioral 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. Clinical implications and suggestions for future research are discussed.

Acknowledgments

I would like to thank Abbie Milich, Harris Montanye, and Victoria Swaine for their help in collecting the data for this research project. I would also like to extend my great appreciation for Dr. Bardeen's guidance and feedback throughout this project.

Table of Contents

Abstract.....	ii
Acknowledgments.....	iii
List of Illustrations.....	vi
Introduction.....	1
Social Cognitive Theory of Self-Regulation.....	1
Emotion Regulation Self-Efficacy.....	2
Assessing Emotion Regulation Self-Efficacy.....	3
Cross-Sectional Associations.....	4
Longitudinal Findings.....	8
Present Study.....	11
Method.....	12
Participants.....	12
Self-Report Measures.....	13
Laboratory Tasks.....	15
Procedure.....	18
Data Analytic Plan.....	19
Results.....	22
Potential Covariates and Confounds.....	22
Primary Analyses.....	23

Discussion.....	25
Interpretation of Results	26
Limitations and Future Directions	29
Conclusions	32
References.....	33

List of Illustrations

Figure 1	43
Figure 2	44

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

Social Cognitive Theory of Self-Regulation

Social cognitive theory, defined broadly, postulates that individuals are active agents of behavioral, cognitive, and emotional change through the use of self-regulatory processes. In Mischel and Shoda's (1995) social cognitive theory of self-regulation, self-regulation influences behavior through mechanisms of a) expectancies and beliefs b) goals and values and c) competencies and strategies. These mechanisms interact with one another, and with external information, to generate self-regulatory behavior (Mischel, Cantor, & Feldman, 1996). For example, losing weight is a common struggle for many, and a good example of self-regulation. To successfully lose weight, individuals must a) believe that they have the capacity to alter their eating behavior and exercise regimen, b) establish daily and weekly goals for calorie intake, hours they plan to exercise, and weight they hope to lose in a given time period, and c) seek out a strategy, perhaps a proven diet and exercise plan, to enact. Without the positive expectancies for weight loss, or self-efficacy (i.e., self-appraisal of one's capabilities to execute a behavior; Bandura, 1982), individuals would not go as far as to set goals and implement strategies for weight loss. Thus, the belief that one has the capacity to adhere to a new diet or exercise regimen is key to self-regulation.

Emotion regulation operates through similar mechanisms (Tamir & Mauss, 2011). In order to successfully regulate a negative emotional experience, one must first believe that he or she is capable of changing his or her current emotional state (i.e., emotion regulation self-efficacy). Secondly, one must have established outcomes that he or she is trying to achieve, in this case, improved mood. And finally, the individual must establish which strategies or

behaviors to implement in order to improve his or her mood. As demonstrated in the example above, self-efficacy is a precondition to successful regulation; if one does not believe that s/he has the ability to change an emotional state, s/he will not proceed in the latter steps of emotion regulation.

Much of the existing research regarding Tamir and Mauss' (2011) social cognitive theory of emotion regulation has focused on the second and third steps of emotion regulation (i.e., goals and strategies), but relatively little attention has been paid to emotion regulation self-efficacy. Additionally, the social cognitive theory of self-regulation postulates that positive expectancies of self-regulation allow a person to flexibly shift strategies multiple times in pursuit of a goal, instead of having a fixed mindset of reliance on one particular strategy (Mischel et al., 1996). Evidence suggests that the ability to flexibly utilize a variety of emotion regulation strategies results in relatively better emotional outcomes (Bonanno, Papa, Lalande, Westphal, & Coifman, 2004; Westphal, Seivert, & Bonanno, 2010). It stands to reason, then, that emotion regulation expectancies, or self-efficacy, are a prerequisite for successful emotion regulation.

Emotion Regulation Self-Efficacy

Domain-specific self-efficacy theory has been examined in an incredibly wide array of psychological and behavioral outcomes from smoking cessation, to academic achievement, and phobias. A higher level of domain-specific self-efficacy consistently predicts success in each respective domain (Bandura, 1982; Bandura & Adams, 1977; Guay, Marsh, & Boivin, 2003; Williams, Kinney, & Falbo, 1989). Emotion regulation self-efficacy, or the belief one has about his or her ability to successfully regulate emotion, should likewise be predictive of emotion regulation success. And while emotion regulation self-efficacy has been linked to several psychological outcomes, such as aggression and prosocial behavior, 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).

As previously mentioned, emotion regulation self-efficacy captures the key evaluative aspect in the process of emotion regulation (Bandura et al., 2003; Gross, 1998). Emotion regulation ability is only part of what is needed to successfully and persistently pursue an emotion regulation goal (e.g., improve mood). The individual must also have the belief that he or she has the capacity to regulate his or her emotional state. For example, an individual's emotion regulation expectancies in the face of receiving criticism from her supervisor may comprise her belief in her ability to a) endure the emotionally taxing conversation and b) inhibit goal-irrelevant distractions (e.g., inhibiting anger-related cognitions). Without these self-efficacy beliefs, the individual would not have the ability to modulate her emotional state and regulate her behavior in pursuit of a valued outcome (e.g., keeping her job).

Assessing Emotion Regulation Self-Efficacy

The construct of negative mood regulation expectancies appears to be synonymous with emotion regulation self-efficacy. It is defined as “the expectancy that some behavior or cognition will alleviate a negative mood state” (Catanzaro & Mearns, 1990, p. 546). It appears that the only difference between emotion regulation self-efficacy and negative mood regulation expectancies is that negative mood regulation expectancies refers to negative mood specifically, whereas emotion regulation self-efficacy can be applied to the spectrum of emotional experience. The Generalized Expectancy for Negative Mood Regulation Scale (NMR) was developed to measure negative mood regulation expectancies (Catanzaro & Mearns, 1990). Items from this self-report measure appear to be consistent with the construct of emotion regulation self-efficacy (e.g., “I can usually find a way to cheer myself up” and “Telling myself it will pass will help

calm me down”), wherein higher scores on the NMR are indicative of lower levels of emotion regulation self-efficacy (Catanzaro & Mearns, 1990). Therefore, findings from the NMR literature should be considered in the context of emotion regulation self-efficacy.

Likewise, the Difficulties in Emotion Regulation (DERS) Strategies subscale maps onto the construct of emotion regulation self-efficacy. This subscale was derived to assess the “belief that there is little that can be done to regulate emotions effectively, once an individual is upset” (Gratz & Roemer, 2004). Precedence for using the DERS-Strategies subscale as a measure of emotion regulation self-efficacy has been established (Bardeen, Fergus, Hannan, & Orcutt, 2016; Bardeen & Stevens, 2015; Fergus, Bardeen, & Orcutt, 2013); higher scores on the DERS-Strategies subscale are associated with lower levels of emotion regulation self-efficacy. In the initial construction of the DERS, scale items were modeled after those of the NMR, with over 75% of DERS items included the NMR sentence stem “When I’m upset” (Gratz & Roemer, 2004). Additionally, the NMR scale was used to establish construct validity. The DERS-Strategies subscale was highly correlated with the NMR ($r = -.69, p < .01$; Gratz & Roemer, 2004). Thus, findings from studies using the DERS-Strategies subscale will also be included in our review of the emotion regulation self-efficacy literature, and referred to as such.

Cross-sectional Associations

Research to date has primarily examined the relationship between emotion regulation self-efficacy and psychological outcomes through the use of cross-sectional study designs. According to the social cognitive theory of emotion regulation (Tamir & Mauss, 2011), emotion regulation self-efficacy precedes and determines the use of emotion regulation strategies (e.g., strategy choice, degree of effort put forth), which then determines emotion regulation-related outcomes (e.g., improved mood, tolerating distress in the service of a valued goal). Thus, high

emotion regulation self-efficacy was expected to be associated with components of emotion regulation that are often considered adaptive, as well as with outcomes that suggest emotion regulation success. Consistent with this logic, emotion regulation self-efficacy is positively correlated with emotion regulation strategies that are often considered to be more adaptive (i.e., cognitive reappraisal, active coping¹), and negatively correlated with strategies considered less adaptive (i.e., expressive suppression, avoidant coping; Gross & John, 2003; Kirsch, Mearns, & Catanzaro, 1990). Though these findings cannot speak to temporal precedent, they do provide evidence that different levels of emotion regulation self-efficacy are associated with the use of more or less adaptive emotion regulation strategies.

Kirsch et. al (1990) provided evidence of associations between emotion regulation self-efficacy and regulatory styles. Specifically, lower levels of emotion regulation self-efficacy were associated with use of avoidance as a coping strategy, depression, and somatic symptoms; higher levels of emotion regulation self-efficacy were associated with active coping, a style of coping that is generally considered to be adaptive. In fact, emotion regulation self-efficacy emerged as the best predictor of specific coping strategies (those that are more adaptive versus those that are less adaptive) above family support and self-confidence. Emotion regulation self-efficacy also uniquely predicted depression and somatic symptoms. Finally, Kirsch et al. (1990) found that a previously insignificant relationship between active coping strategies and depression was positive and significant once emotion regulation self-efficacy was added to the hierarchical regression model. As explained by Catanzaro and Mearns (1999), it is possible that those with

¹ It is important to note that coping and emotion regulation are considered related, but different constructs. Coping generally refers to efforts to alleviate negative mood states, rather than discrete emotions, over a longer duration (e.g., coping with the loss of a loved one), whereas emotion regulation can be applied to both positive and negative discrete emotions, and can occur over a short duration of time (Gross & Thompson, 2007).

low emotion regulation self-efficacy use a wider variety of active coping strategies, but with little confidence in their success, which then maintains dysphoric mood. Thus, the expectancy that one will not be able to successfully regulate negative emotions becomes a self-fulfilling prophecy.

Additionally, emotion regulation self-efficacy has been identified as an important moderator in the relationship between coping and psychological abuse (e.g., extreme ridicule, threatening an individual, restricting a person's freedoms), and may be especially important factor in high-risk populations (Shepherd-McMullen, Mearns, Stokes, & Mechanic, 2015). For example, among victims of psychological abuse, emotion regulation self-efficacy interacted with psychological abuse to predict avoidant coping, such that those at low levels of emotion regulation self-efficacy and high levels of psychological abuse were at most danger for using avoidant coping (Shepherd-McMullen et al., 2015). In the context of domestic violence, where psychological abuse is often high, avoidant coping could increase the likelihood that a victim will stay in an unhealthy, and potentially dangerous, environment rather than pursuing safer alternatives.

In a set of studies with undergraduate students, Fergus et al. (2013) found that emotion regulation self-efficacy (as measured via the DERS-Strategies subscale) interacted with experiential avoidance (i.e., unwillingness to stay in contact with uncomfortable internal experience [e.g., emotions, cognitions]) to predict depression, stress, and anxiety, such that the relationship between experiential avoidance and these psychological outcomes became stronger at lower levels, and weaker at higher levels, of emotion regulation self-efficacy. As such, emotion regulation self-efficacy may buffer the effects of vulnerability factors on negative psychological outcomes, thus, further highlighting the importance of this construct as it relates to

psychological well-being. This is consistent with evidence showing emotion regulation self-efficacy moderates the relationship between anxiety sensitivity and anxious arousal, worry, and agoraphobia independently, such that those high in anxiety sensitivity and low in emotion regulation self-efficacy had greater levels of each anxiety-related outcome (Kashdan, Zvolensky, & McLeish, 2008).

In addition to serving as a risk (low self-efficacy) and protective (high self-efficacy) factor, emotion regulation self-efficacy explains unique variance in the relationship between other established risk factors and psychological outcomes. In a study of 206 adults by Mehrotra and Tripathi (2012), emotion regulation self-efficacy (as measured via the NMR) predicted perceived stress better than gender, age, affect intensity and negative reactivity, accounting for nearly 20% of additional variance. Emotion regulation self-efficacy also accounted for 16% of additional variance beyond the aforementioned variables in predicting psychological well-being. Moreover, three studies of adult participants found that emotion regulation self-efficacy was associated with depression, independent of trait negative affect and positive affect in three studies using adult participants (Catanzaro et al., 2014). Furthermore, emotion regulation self-efficacy predicted depression symptom change better than positive and negative trait affect variables (i.e., trait positive affectivity: high energy, engagement, and concentration; trait negative affectivity: distress, dysphoric emotion).

Emotion regulation self-efficacy has been shown to account for unique variance, above and beyond other established risk factors, in predicting a variety of other maladaptive outcomes, including posttraumatic stress disorder (PTSD) diagnostic status (DiMauro, Renshaw, and Kashdan, 2016), depressive symptoms (Catanzaro et al., 2014), borderline personality disorder symptoms (BPD; Salsman & Linehan, 2012), and binge eating symptoms (Whiteside et al.,

2007). For example, Perez, Venta, Garnaat, and Sharp (2012) found that, of several facets of emotion dysregulation (i.e., nonacceptance of emotions, lack of awareness and clarity of emotions, inability to control impulses, and inability to pursue goals; Gratz & Roemer, 2004), only emotion regulation self-efficacy (as measured by DERS-Strategies) predicted nonsuicidal self-injury (NSSI) after controlling for sex and psychopathology (i.e., depression, anxiety, ADHD, conduct disorder, and oppositional defiant disorder). Additionally, a Receiver Operating Characteristics (ROC) analysis was conducted to ascertain the clinical utility of the DERS-Strategies subscale in identifying NSSI by identifying a cut-off score that optimized sensitivity and specificity. The identified cut-point of the DERS-Strategies subscale was a moderate predictor of NSSI and discriminated between inpatient adolescents who had been hospitalized due to NSSI versus those who had not. It may be that individuals with lower levels of emotion regulation self-efficacy are at higher risk for using maladaptive emotion regulation strategies, such as NSSI. Thus, it may be important to target emotion regulation self-efficacy in treatment for individuals who use NSSI to alleviate emotional distress.

Longitudinal Findings

Based on the social cognitive theory of emotion regulation (Tamir & Mauss, 2011), emotion regulation self-efficacy was expected to precede regulatory behavior and psychological outcomes. Some longitudinal evidence supports this proposition. In a longitudinal study of undergraduates who had been in a romantic relationship at Time 1, but ended their relationship by Time 2 (six months later), Mearns (1991) examined the temporal effect of emotion regulation self-efficacy on coping behavior and depressive symptoms. Time 1 emotion regulation self-efficacy was a significant predictor of a) depression following a distressing event (i.e., a breakup) and b) attempts to actively cope with the distressing event (as measured by the Coping

Behaviors Inventory; Kirsch et al., 1990). In another study, Kassel, Bornovalova, and Mehta (2007) found that emotion regulation self-efficacy predicted anxiety and depression symptom change among undergraduate students over the course of eight weeks even after controlling for age, sex, general distress, and regulatory styles. Similar associations have been identified over the span of one and two years (Davis, Andresen, Trosko, Massman, & Lovejoy, 2005; Bandura et al., 2003). Bandura et al. (2003), who conceptualized affective self-regulatory efficacy as one's perception of his or her ability to manage his or her emotional life, found that lower levels of negative affect self-efficacy at Time 1 predicted higher depressive symptoms at Time 2 (two years later) in a sample of 463 older adolescents. 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 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 et al. (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.

In a sample of 41 undergraduates, Bigman et al. (2016) manipulated emotion regulation self-efficacy by convincing participants in the expected success condition that a placebo pill would enhance emotional control. Participants (expected success [n = 22] versus control [n = 19]) were exposed to two negative mood manipulation procedures (i.e., emotional film clips). State affect was measured before and after each film clip and the emotion regulation self-efficacy procedure (the placebo pill) was given to both groups before viewing the second film clip. Affective change during the first film clip was examined to ensure that there were not between group differences independent of the emotion regulation self-efficacy manipulation. Before viewing the second film clip, all participants were told to minimize the emotional impact of the film, as it would interfere with their memory of the film, which would be tested following the film clip. This memory component was used in order to mask the real purpose of the study.

No group differences in affective change were observed during the first film clip. However, as expected, individuals in the expected success condition reported less negative and more positive affective change following the second film clip, compared to the control participants. Groups did not differ in self-reported attempts to regulate emotions in response to the second film clip, but did differ in perceived success at regulating emotions, such that the expected success group reported themselves to be more successful 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 attempt 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. Bigman et

al. (2016) acknowledged that the use of self-reported attempts to regulate emotion, rather than using an objective measure of regulatory ability, limits the ability to address the second possibility. As noted by Bigman et al. (2016), it will be important to use behavioral measures of emotion regulation in future studies to examine whether manipulating emotion regulation self-efficacy actually results in differences in emotion regulation ability.

Present Study

The current study builds on existing emotion regulation self-efficacy findings by incorporating a behavioral task as a measure of effort to pursue goal-relevant behavior while experiencing emotional distress (i.e., emotion regulation). The use of this task allows for a determination to be made regarding whether the manipulation of self-efficacy leads to actual increases in regulatory ability rather than simply affecting self-reports of distress. The procedure outlined by Bigman et al. (2016) was used in this study, with several modifications. First, the Positive and Negative Affect Schedule (PANAS) was used to measure affect, rather than the unvalidated 7-point Likert scale used by Bigman et al. (2016). Additionally, baseline working memory was measured to enhance our cover story and baseline emotion regulation self-efficacy was measured to account for any between-group differences before manipulating this construct. Instead of a film clip, negatively valenced emotional images were used (International Affective Picture System [IAPS]; Lang, Bradley, & Cuthbert, 2005); these images have been shown to induce negative affect in a large number of studies (e.g., Bardeen, 2015; Bardeen & Orcutt, 2011; Pretz, Totz, & Kauffman, 2010). Finally, and most importantly, the computerized Mirror Tracing Persistence Task (MTPT-C) task was used as a measure of ability to engage in goal-directed behavior when distressed (i.e., emotion regulation; Gratz, Rosenthal, Tull, Lejuez, & Gunderson, 2006).

I hypothesized that, in line with Bigman et al. (2016), the groups would not differ in baseline affective change in response to viewing IAPS images (Hypothesis 1), but the expected success condition would report less negative affective reactivity compared to the control condition following the distress inducing task (i.e., MTPT-C; Hypothesis 2). Consistent with Bigman et al. (2016), participants in the expected success condition were expected to would rate their success to regulate emotions higher than participants in the control condition (Hypothesis 3), but group differences in reported regulation efforts were not expected (Hypothesis 4). Consistent with the social cognitive theory of emotion regulation (Tamir & Mauss, 2011), which suggests that beliefs about emotion regulation directly influence emotion regulation ability, I 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 5). Moreover, performance on the behavioral task was expected to partially explain the association between the manipulation and self-reported negative affective reactivity (i.e., change in affect from baseline to post MTPT-C; Hypothesis 6). This hypothesis is consistent with the social cognitive theory of emotion regulation (Tamir & Mauss, 2011), in which beliefs about emotion regulation directly influence how emotion regulation ability is utilized, which in turn, influences one's emotional experience.

Method

Participants

Undergraduate participants were recruited through Auburn University's online SONA system, which awards students credit for participating in research. To be eligible, participants were required to be between the ages of 18-64, and have no vision or motor problems that would affect task completion. Six participants were removed from the sample for the following reasons.

One participant did not complete the manipulation procedure, three participants in the expected success condition did not correctly identify emotional control as one side effect of the pill, and two participants correctly identified the pill as a placebo when probed for suspicion. Additionally, three outliers were identified as having undue influence on the primary analytic models, and thus, were removed from the sample. These three cases were identified using the two-pronged, multivariate approach outlined by Aguinis and Joo (2015). First, all predictors in a given model are regressed onto a dummy variable and the Difference in Fits influence statistic (i.e., DFFITS) is saved via SPSS (IBM SPSS, Version 23.0). Next, a designed-based cutoff value is identified using the formula: $\pm \sqrt{\frac{k+1}{n}}$, where k refers to the number of predictors and n refers to sample size (Aguinis & Joo, 2015). Each case with a DFFITS value greater than the identified cut score was removed the sample, one at a time, and the analyses below were run to determine if each specific case exhibited undue influence on the model. For models involving variables that were assessed before the manipulation (i.e., residual change scores from T1 to T2 NA, DERS-Strategies, sex, age), multivariate outliers were examined in the full sample. For models that included variables that were measured post-manipulation, influential multivariate outliers were identified between groups (i.e., residual change scores from T2 to T3 NA, latency to quit, and follow-up questions).

The final sample ($N = 70$) was largely female ($n = 54$; 77.1%) with an average age of 18.8 ($SD = 0.96$, *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.

Self-Report Measures

Positive and Negative Affect Schedule. The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) measures two dimensions of affect: positive (PA; 10 items) and negative (NA; 10 items). Items are scored on a 1 (*very slightly or not at all*) to 5 (*extremely*) scale. The PANAS has demonstrated adequate internal consistency in undergraduate samples (α ranging from .84 - .89 for both PA and NA scales; Koff & Lucas, 2011; Odou & Brinker, 2015; Watson et al., 1988) and strong criterion-related validity (PA and Depression Anxiety and Stress Scale [DASS], $r = -.48, p < .01$; NA and DASS, $r = .60, p < .01$; Crawford & Henry, 2004). The PANAS is sensitive to within-session mood inductions, such as the one presented in the current study (Rusting & Larsen, 1997; Schneider, Gur, Gur, & Muenz, 1994). Internal consistency in the current sample for NA was acceptable at all three timepoints (α ranging from .79 - .85).

Difficulties in Emotion Regulation Scale-Strategies subscale. The Difficulties in Emotion Regulation Scale-Strategies subscale (DERS; Gratz & Roemer, 2004) consists of eight items that assess one's 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"). Participants respond on a scale ranging from 1 (*almost never*) to 5 (*almost always*), with higher scores indicating lower emotion regulation self-efficacy. The DERS-Strategies subscale has been identified and used as a measure of emotion regulation self-efficacy (Bardeen et al. 2015; Fergus et al., 2013), and correlates with the Generalized Expectancy for Negative Mood Regulation Scale at a level that may suggest measurement of a corresponding construct ($r = -.69, p < .01$, Gratz & Roemer, 2004). Additionally, DERS-Strategies has consistently exhibited good internal consistency ($\alpha = .87$ and $.88$; Coffey, Hartman, & Fredrickson, 2010; Gratz & Roemer, 2004). The DERS-Strategies subscale was used as a baseline measure of emotion regulation self-

efficacy to examine any group differences prior to the emotion regulation self-efficacy manipulation. Internal consistency in the current sample was excellent ($\alpha = .91$).

Laboratory Tasks

Short-term memory task. The forward and backward Digit Span (DS) task was administered to participants in order to obtain baseline short-term memory scores. Digit span is a conventional and widely used standard assessment of verbal short-term memory (Wechsler, 2008; Greiffenstein, Baker, & Gola, 1994) in which participants must verbally recall a span of digits that were verbally presented to them in forward sequence (Digit Span-Forward; DSF), and on separate trials, in reverse sequence (Digit Span-Backward; DSB). The maximum length of digit string for which the individual can correctly recall two strings of the same length is used as the measure of digit span. DSF and DSB assess related, but distinct cognitive processes. Whereas both DSF and DSB require individuals to register information that was verbally presented, the DSB also requires an individual to hold the digit span in memory and concurrently manipulate the information, and thus serves as a better indicator of working memory (Conklin, Curtis, Katsanis, & Iacono, 2000; Lichtenberger & Kaufman, 2012; Wechsler, 2008). A sum score of the maximum string for DSF and DSB (total DS score) is a more robust measure of short-term memory and is frequently used in the memory literature (Passarotti, Trivedi, & Patel, 2016; Schroeder, Twumasi-Ankrah, Baade, & Marshall, 2012; Tian et al., 2015). The DS total score has demonstrated strong discriminant validity (Jasinski, Berry, Shandera, & Clark, 2011), test-retest reliability ($r = .83$; Wechsler, 2008), and internal consistency for s ($\alpha = .91$; Wechsler, 2008).

Negative mood induction. Forty negatively valanced emotional stimuli (e.g., man with gun, bloody hand, plane crash) from the IAPS (Lang et al., 2005) were used to induce negative

affect in participants (negative valence and high arousal: $M = 2.17$ and 6.52 , respectively; Bardeen, 2015). Use of image sets with similar valence and arousal have been used successfully to induce negative affect, as measured by the PANAS (Pretz et al., 2010). In line with Pretz et al.'s mood induction procedure, negative images were shown for five seconds each, with a one and a half second pause between images. To ensure that participants looked at the images, participants were told that they would be shown a series of images, and 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 (e.g., Bornovalova et al., 2008). For the computerized version of the MTPT, participants use the computer mouse to trace a red dot as it follows a path along the lines of a shape (e.g., star, circle). However, the dot moves (or draws) in the reverse direction of the mouse, making this task difficult and frustrating. 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 so that the participant needs to start over. Participants have up to 60 seconds to successfully trace the first two shapes before the task proceeds to the next level. The third shape (a star) is the most difficult. 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 are able to end the task at any point during the third trial by pressing the "QUIT" button on the screen. 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 number of errors made during the first two trials is used as a measure of skill. In line with a previously established incentive procedure (Lejuez, Kahler, & Brown, 2003), participants were told that they would receive \$5 if their performance was determined to be above average at the end of the task. This incentive was used to increase motivation toward goal pursuit (i.e., successfully tracing the shape) despite the emotional distress that they experienced. Regardless of performance, all participants received \$5 as compensation for their participation.

Scores on the MTPT-C are positively correlated with scores on the computerized Paced Auditory Serial Addition Task (PASAT-C; Lejuez et al., 2003), another behavioral measure of emotion regulation ($r = .38, p < .01$; Daughters et al., 2005). The MTPT-C has demonstrated criterion-related validity by predicting early treatment dropout among substance users (Daughters et al., 2005) and smoking cessation failure (Brandon et al., 2003). In support of the concurrent validity of the MTPT-C, individuals with relatively higher levels of dysphoria quit the task significantly faster than those with relatively lower levels of dysphoria (Ellis, Fischer, & Beevers, 2010). Furthermore, evidence suggests that performance on the MTPT-C can vary within persons by manipulating a number of factors, such as the degree of distress that is induced, rather than measuring a more trait-like construct goal (Steinberg & Williams, 2013). As such, the MTPT-C seemed to be particularly well suited for the current study in which between-group differences in regulatory ability were expected based on the emotion regulation self-efficacy manipulation that was used. The MTPT-C has exhibited discriminative validity; individuals with BPD, a disorder characterized by emotion dysregulation, are significantly less likely to persist on the MTPT-C, compared to individuals without BPD (Bornovalova et al., 2008).

Procedure

All study procedures were reviewed and approved by the Institutional Review Board at Auburn University prior to data collection. At the beginning of the experimental session, participants completed informed consent. Participants completed the remainder of the study in an experimentation room, containing a desk, a chair, and a computer. Participants were 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, working memory, and emotion regulation self-efficacy. The negative affect induction procedure (Bardeen, 2015; Pretz et al., 2010) was conducted next. 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 and identify some of the images. This facilitated our cover story and ensured that participants attended to the images.

After the negative affect induction procedure, participants completed a second assessment of affect (Time 2 [T2]). The placebo drug was administered next. 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.² Participants were asked to describe potential side effects to ensure that participants in the expected success condition understood that enhanced emotional control is a

² Per the script used by Bigman et al. (2016), the researcher explained the side effects to participant with the script: "Existing research on Anahance has shown that it effectively promotes long-term memory. It is completely safe within the small dosage limits to be utilized in this research. It is safe to take Anahance in and combination with any doctor-prescribed medication. Anahance has very few side effects, all of which dissipate about an hour after administration. One anticholinergic side effect of Anahance involves dryness of the mouth. Some people may also experience temporary abdominal discomfort, such as gas or bloating. Another common side effect involves enhanced emotion control. Anahance acts by changing the hemodynamic balance in the prefrontal cortex, an area involved in cognitive and emotional control. It temporarily increases blood flow to areas involved in memory processing. However, as a result, blood flow to areas involved in emotion control is also temporarily increased. Therefore, after taking Anahance, people often report that their emotions become easier to control. Anahance, in other words, does not to influence the way one responds to emotional events. Rather, it influences the extent to which emotional responses can be changed, that is, deliberately increased or decreased. As with the anticholinergic side-effect, the emotional side effect dissipates completely about an hour after administration."

documented side effect. During the last portion of the study, participants performed the emotion regulation task (MTPT-C), followed by administration of one final measure of affect (Time 3 [T3]). Participants were then asked how well they thought they were able to regulate their emotions during the task (“To what extent were you successful at minimizing your emotional reactions during the task?”, rated 1-7 [*not at all* to *extremely*]), and how hard they tried to adhere to the task despite frustration (“To what extent were you trying to minimize your distress during the task?” rated 1-7 [*not at all* to *extremely*]).

In keeping with the cover story, all participants viewed a series of ten negatively valenced IAPS images (Lang et al., 2005). Five of the images were new images and five were presented during the first negative affect induction. The images appeared on the screen for five seconds, and participants were instructed to press “1” if they recognized the image from the previously shown set of 40 images. Finally, participants were probed for suspicion (“What was this study about? Try to be as specific as you can.” and “Was there anything about this study that seemed unusual or suspicious?”). Participants were then partially debriefed. That is, participants were not told that the pill was a placebo. This approach was necessary to avoid having participants reveal this fact to their undergraduate peers who may have participated in the study at a later time. However, participants had the option to receive a more in-depth debriefing letter upon the end of data collection.

Data Analytic Plan

Preliminary analyses. Demographic variables (e.g., age, sex, race/ethnicity) were examined. Race and ethnicity were collapsed into a single dummy coded variable (coded as Hispanic and/or non-White [$n = 12, 17.1\%$] versus non-Hispanic White [$n = 58, 82.9\%$]). Means, standard deviations, and bivariate correlations were calculated in order to better understand the

association between descriptive statistics and variables of interest (i.e., T1 NA, T2 NA, T3 NA, DERS-Strategies, MTPT-C latency to quit, self-reported attempts to control emotion during the MTPT-C, and self-reported belief in emotion regulation ability during the MTPT-C).

Examination of bivariate correlations aided in the identification of potential covariates.

Specifically, demographic variables that were significantly associated with variables of interest were included as covariates in the primary analytic models. Cronbach's alpha was calculated to examine the internal consistency of self-report measures.

Hypothesis 1. Three analysis of covariance (ANCOVAs) tests were conducted to test the hypotheses that groups would not differ on baseline measures of negative affect (T1 NA), emotion regulation self-efficacy (DERS-Strategies), and baseline affective reactivity. For each of the variables of interest, condition served as the independent variable, the variable of interest (i.e., T1 NA, DERS-Strategies, baseline affective reactivity) served as the dependent variable, and relevant demographic variables, as described above, were included as covariates. Baseline affective reactivity was calculated as the standardized residual score produced by regressing T1 NA on T2 NA. Standardized residual change scores are described as a “base-free” measure of change that is superior to simple difference scores, which fail to account for baseline differences in pretest values (Cronbach & Furby, 1970; Gratz, Bardeen, Levy, Dixon-Gordon, & Tull, 2015; Tucker, Damarin, & Messick, 1966).

Hypothesis 2. A similar method was used to test the hypothesis that the expected success condition would demonstrate less negative affective reactivity from T2 to T3. Specifically, a residual change score, calculated to assess affective reactivity from T2 to T3, served as the dependent variable in an ANCOVA. Condition served as the independent variable in the model

and the residual change score in NA from T1 to T2 (i.e., baseline affective reactivity) served as a covariate in the model.

Hypotheses 3 and 4. 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 3), an ANCOVA was conducted in which reported emotion regulation ability during the MTPT-C served as the dependent variable (i.e., “To what extent were you successful at minimizing your emotional reactions during the task?”), and condition (expected success versus control) served as the independent variable, controlling for baseline emotion regulation self-efficacy (i.e., DERS-Strategies). Similarly, to test Hypothesis 4, an ANCOVA was conducted in which self-reported emotion regulation attempt served as the dependent variable (i.e., “To what extent were you trying to persist in the task despite frustration?”) and condition served as the independent variable, controlling for baseline emotion regulation self-efficacy.

Hypotheses 5 and 6. To test the hypothesis that those in the expected success condition would perform better on the emotion regulation task (Hypothesis 5), an ANCOVA was conducted in which latency to quit on the MTPT-C served as the dependent variable, and condition served as the independent variable. To test Hypothesis 6, that latency to quit the MTPT-C would mediate the association between condition and post-manipulation affective reactivity, a mediation analysis was conducted using the PROCESS plug-in for SPSS (Hayes, 2012). 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 T2 to T3 as the dependent variable (Y), with T1 NA serving as a covariate. Bootstrapped samples (5,000 samples) were estimated as outlined by Hayes (2009). Bootstrapped confidence intervals for the indirect effect of X on Y through M is a more reliable estimate, compared to the traditional

Sobel test (Sobel, 1987), especially in small samples (Preacher and Hayes, 2009; Schönfeld, Brailovskaia, Bieda, Zhang, & Margraf, 2016). In Figure 1, path *a* represents the effect of the independent variable (*X*) on the mediator (*M*), and path *b* represents the effect of the mediator (*M*) on the dependent variable (*Y*), after accounting for the effect of *X*. The indirect effect is thus quantified as *ab*. Path *c* represents the direct effect of *X* on *Y*. The total effect is the sum of the direct and indirect effects on the dependent variable (i.e., $c = c' + ab$). As such, *c'* represents the difference between the total effect and the indirect effect ($c = c' + ab$).

Results

Potential Covariates and Confounds

Bivariate correlations revealed that, among potential covariates (i.e., age, sex, race/ethnicity), 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, sex was significantly associated with several variables of interest, including T1 NA ($r = -.23, p = .056$; marginally significant), T3 NA ($r = -.37, p = .001$), negative affective reactivity from T2 to T3 ($r = -.33, p = .005$), and self-reported attempts to minimize distress during the task ($r = -.23, p = .055$; marginally significant). Specifically, males reported higher NA at T1 and T3 and greater reactivity from T2 to T3 (i.e., greater increase in NA between T2 and T3). Males also reported greater attempts to minimize their distress during the MTPT-C. As such, sex and age were included as covariates in all the subsequent analyses. An independent samples t-test was conducted to determine whether there were between-groups differences in memory, as measured via the Digit Span-Forward and Digit Span-Backward, as participants believed the study was examining the effects of a drug on memory. There were no significant

group differences in either Digit Span-Forward ($t[66] = .69, p = .493$) or Digit Span-Backward ($t[66] = .06, p = .954$), equal variances assumed.

Primary Analyses

Hypothesis 1. A series of ANCOVAs were conducted to examine baseline differences between participants in the expected success and control conditions. Age and sex served as covariates in all models. 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 ($F[1,66] = .63, p = .432$).

Hypothesis 2. One of the primary hypotheses was that those in the expected success condition would report less negative affective reactivity from T2 (immediately after the negative mood induction) to T3 (immediately after completing the MTPT-C). Results from ANCOVA, testing the hypothesis that those in the expected success condition would experience less self-reported negative affective reactivity from T2 to T3 compared to those in the control condition, approached significance ($F[1, 65] = 3.80, p = .055, \eta^2 = .06$). However, both groups exhibited decreases, rather than increases, in negative affect from T2 to T3. Specifically, those in the expected success condition exhibited significantly greater mood recovery ($M = -3.76, SD = 5.44$) than those in the control condition ($M = -2.28, SD = 5.16$; Figure 2).

Because the T1 measure of NA was assessed before any manipulation or mood induction procedure was instituted, as opposed to NA assessed at T2 (after negative mood induction), the residual change in NA from T1 to T3 may provide a more accurate view of self-reported negative affective reactivity. As such, between-group differences in self-reported negative affective reactivity from T1 to T3 was examined (i.e., residual change). A significant between-

groups difference was observed in self-reported negative affective reactivity from T1 to T3 ($F[1,66] = 4.78, p = .032$; expected success condition: $M = -.26, SD = .16$; control condition: $M = .24; SD = .16$; see Figure 2).

Hypotheses 3 and 4. 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 ($F[1, 65] = .11, p = .740$). In addition, there were no 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 ($F[1, 65] = .11, p = .742$).

Hypothesis 5. The primary outcome of interest is latency to quit (in seconds) from the MTPT-C (i.e., how long a participant chooses to persist on the emotion regulation task). Because the task is titrated for difficulty based on task ability, it is assumed that all participants experience a similar level of task difficulty for the final round of the MTPT-C. There was considerable variability in participants' persistence on the task across groups (range: 1.53 - 420.00; $M = 126.51 [SD = 109.24], Mdn = 96.79$). 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 ($F[1, 66] = .003, p = .960$).

Hypothesis 6. Results of the mediation analysis indicated that the effects of condition on latency to quit the MTPT-C (path a ; $b = -1.36, p = .961$), and latency to quit the MTPT-C on post-manipulation affective reactivity (path b ; $b = 0.0003, p = .725$) were not significant. The total effect of condition on post-manipulation affective reactivity was significant ($b = -0.42, p = .057$), and the effect remained after accounting for the mediator ($b = -0.42, p = .060$). Finally, the

indirect effect was not significant ($b = -0.0005$, 95% CI = $-.069, .064$). The results were similar when residual change scores from T1 to T3 served as the dependent variable (total effect, $b = 0.47$, $p = .035$; direct effect, $b = 0.46$, $p = .071$; indirect effect, $b = -.001$, CI = $-.094 - .071$). Therefore, there is an observed relationship between condition and post-manipulation affective reactivity, but it is not explained by performance on the MTPT-C.

Discussion

The current study examined temporal relations between emotion regulation self-efficacy, negative affect, and emotion regulation ability via an experimental paradigm. Consistent with results from Bigman et al. (2016), and social cognitive theory of emotion regulation, emotion regulation self-efficacy emerged as a significant predictor of psychological well-being (Bandura et al., 2003; Davis et al., 2005; Mearns, 1991). However, emotion regulation self-efficacy does not appear to have influenced emotion regulation ability, as measured via an objective behavioral task. Furthermore, there was no support for the hypothesis that the relationship between emotion regulation self-efficacy and self-reported negative affective reactivity is explained by emotion regulation ability. That is, it does not appear that manipulating emotion regulation self-efficacy leads to changes in objectively assessed emotion regulation ability, which in turn, was hypothesized to lead to changes in affective reactivity.

Of note, the study design may have limited our ability to clearly articulate the nature of relations among emotion regulation self-efficacy and reactivity to a distressing task. Specifically, negative affect was assessed immediately following the first mood manipulation procedure, but not following the cool down period prior to administration of the distressing task. As a result (see Figure 2), the observed change in negative affect between T2 and T3 is best characterized as mood recovery, rather than negative affective reactivity. However, negative affect assessed at T1

does appear to be an accurate assessment of baseline negative affect. As such, the change in negative affect from T1 to T3 would appear to be a better representation of affective reactivity than changes from T2 to T3. Using this conceptualization of affective reactivity, results indicate that those in the expected success condition exhibited less negative affective reactivity, compared to those in the control condition.

The causal relationships between emotion regulation self-efficacy, emotion regulation ability, and self-reported affect can be explained in three ways. First, as was hypothesized in the current study, enhanced emotion regulation self-efficacy may lead to increased emotion regulation ability, which thereby decreases self-reported negative affect. Second, emotion regulation self-efficacy may directly influence self-reported affect. Third, those with better emotion regulation abilities may accurately perceive their ability level, thus having relatively greater emotion regulation self-efficacy as a function of actual ability level. One other possibility, which remains to be tested, is that emotion regulation self-efficacy and emotion regulation ability may influence one another in a reciprocal fashion, thus decreasing affective reactivity in the face of stressors, and reducing psychological distress, over time.

Interpretation of Results

The primary aim of the current study was to determine if emotion regulation self-efficacy influenced emotion regulation ability, thereby influencing self-reported negative affect. However, results from the current study did not support this theory. If higher emotion regulation self-efficacy led to more effective regulation of emotions, it would be expected that those in the expected success condition would have persisted longer at the MTPT-C, because they would have more effectively regulated task-induced emotional distress in pursuit of the goal (performing in the top 50% of participants to obtain the \$5 reward). Or, an indirect effect of

condition on post-manipulation self-reported negative affect, through latency to quit the MTPT-C, would have been observed. However, results did not support either hypothesis. Furthermore, participants across conditions did not differ in their self-reported attempts to regulate emotions during the distressing task, suggesting that those who expected themselves 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 as though enhanced emotional regulation self-efficacy altered emotion regulation ability and degree of effort toward regulation. The current study is the only study, to my knowledge, that has directly assessed whether emotion regulation self-efficacy influences emotion regulation ability.

A second explanation of the causal associations between variables of interest is that emotion regulation self-efficacy directly influences psychological outcomes, which is consistent with this study's finding 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 the same finding from Bigman et al. (2016). In a longitudinal study, Bandura et al. (2003) demonstrated that negative emotion regulation self-efficacy prospectively predicted depressive symptoms. These results are consistent with findings from the present study which suggest that emotion regulation self-efficacy precedes subjective psychological experience and associated maladaptive behaviors.

A third 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. However, the experimental nature

of the current study runs counter to this claim, such that emotion regulation self-efficacy emerged as a causal predictor of self-reported negative affective reactivity.

Alternatively, it is possible that emotion regulation self-efficacy first acts directly on short-term affective experience, much like a placebo effect, as was observed in the current study. That is, as was observed in the present study, 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; the question remains, how long does a manipulation of emotion-regulation self-efficacy influence self-reported affective reactivity over time? It seems unlikely that a one-session manipulation would lead to long-term changes in affective reactivity. On the other hand, 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. That is, those who are less likely to subjectively experience relatively greater negative affective reactivity in the face of daily stressors may be in a state of mind that is more amenable to developing relatively better emotion regulation abilities (e.g., through vicarious learning) in comparison to those with lower emotion regulation self-efficacy who experience higher levels of negative affective reactivity in the face of stressors. 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 effects long-term psychological outcomes.

Limitations and Future Directions

As mentioned above, the study design may have limited our ability to accurately assess negative affective reactivity between T2 and T3. When the T2 assessment of negative affect took place, participants were experiencing a heightened state of negative affect, and thus any affect measured thereafter, without a re-establishment of baseline affect, can only be interpreted as self-reported mood recovery. Although changes in negative affect from T1 to T3 provide a better assessment of self-reported negative affective reactivity, the study design would have been improved if a fourth assessment of negative affect had been added to the study (i.e., following the cool down period and before the distressing task). With the addition of this assessment of negative affect, we would have been able to (a) determine whether negative affect returned to baseline levels prior to the distressing task and (b) provide a more accurate assessment of negative affect reactivity from T2 to T3.

It should be noted that results indicated that those in the expected success condition experienced greater mood recovery following a distressing task, trending toward significance ($p = .055$). However, given the relatively small sample size, and the medium-sized effect, it is likely that the relationship between condition and post-manipulation self-reported mood recovery would have reached significance in a larger sample. Additionally, affective reactivity

significantly differed between groups from T1 to T3. Additionally, the current sample was limited in that it was comprised of all undergraduate students, a majority of whom were female and white. Therefore, the generalizability of the present findings is limited. Furthermore, although sex was covaried for in all analyses, it is possible that sex has a more complex relationship with variables of interest. Some evidence suggests that there may be differences in emotion regulation and emotion regulation self-efficacy in males and females (Bardeen & Stevens, 2015; Nolen-Hoeksema, 2012; Nolen-Hoeksema & Aldao, 2011). Due to a limited number of males in the current sample ($n = 16$), the effect of sex on the relations of interest could not be examined. Thus, future studies should aim to recruit a larger, more diverse sample, with a more equal split between males and females, in order to generalize findings and examine potential sex effects. Finally, the current sample was limited in that it was not a clinical sample. Emotion regulation is often examined in the context of psychopathology (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Sheppes, Suri, & Gross, 2015; Werner & Gross, 2010), and therefore it will be important to replicate study findings in a clinical sample.

Although a one-session manipulation of emotion regulation self-efficacy may not have been sufficient to induce behavioral change (i.e., enhanced emotion regulation ability), 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 enhanced 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 exposure to practice in utilizing emotion regulation skills. Subsequently,

examining the relations between emotion regulation self-efficacy, emotion regulation ability, and psychological outcomes over time is warranted.

An additional explanation for why enhanced emotion regulation ability may not have been observed in the expected success group is that participants may not have clearly understood the relationship between enhanced emotional control and success in the task. Participants were not explicitly told that success in the task required persistence, and that inhibiting distress would help them persist longer at the MTPT-C. Tamir and Bigman (in press) 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 between-groups difference; those in the expected success condition may have persisted longer on the MTPT-C. Of note, Bigman et al. (2016) provided a more explicit instruction to participants stating that participants should attempt to minimize the emotional impact of the film. This may explain why the current study did not replicate the finding from Bigman et al. (2016) in which those in the expected success condition rated themselves as more successful at minimizing emotional reactions during the MTPT-C. Future studies may incorporate this component in a similar study design in order to clarify whether providing an explicit link between emotion regulation and the emotion regulation task would lead to an observation that enhanced emotion regulation self-efficacy leads to enhanced emotion regulation ability. Finally, there is a need for replication of this study, as this was the first study to examine the relationship between emotion regulation self-efficacy and emotion regulation ability as measured via an objective behavioral task.

Treatments that focus on emotion regulation skill building, such as dialectical behavioral therapy (DBT), have been shown to result in increased emotion regulation self-efficacy.

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.

Conclusions

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, and mood recovery, but not emotion regulation ability. Additionally, emotion regulation ability did not mediate the relationship between emotion regulation self-efficacy and affective reactivity or mood recovery. Therefore, results from this study support existing literature highlighting the importance of social cognitive factors in psychopathology (Tamir & Bigman, in press; Tamir & Mauss, 2011), as well as existing literature that suggests emotion regulation self-efficacy predicts psychological well-being. Thus, emotion regulation self-efficacy may be an important treatment target in clinical interventions (Bandura et al., 2003; Davis et al., 2005; Kassel et al., 2007; Mearns, 1991).

References

- Aguinis, H., & Joo, H. (2015). Debunking myths and urban legends about how to identify influential outliers. In: C. E. Lance & R. J. Vandenberg (Eds.), *More Statistical and methodological Myths and Urban Legends* (pp. 207-223). New York: Taylor & Francis.
- Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review*, *30*(2), 217-237.
- Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, *37*(2), 122.
- Bandura, A., & Adams, N. E. (1977). Analysis of self-efficacy theory of behavioral change. *Cognitive Therapy and Research*, *1*(4), 287-310.
- Bandura, A., Caprara, G. V., Barbaranelli, C., Gerbino, M., & Pastorelli, C. (2003). Role of affective self-regulatory efficacy in diverse spheres of psychosocial functioning. *Child Development*, *74*(3), 769-782.
- Bardeen, J. R. (2015). Short-term pain for long-term gain: The role of experiential avoidance in the relation between anxiety sensitivity and emotional distress. *Journal of Anxiety Disorders*, *30*, 113-119.
- Bardeen, J. R., Fergus, T. A., Hannan, S. M., & Orcutt, H. K. (2016). Addressing psychometric limitations of the Difficulties in Emotion Regulation Scale through item modification. *Journal of Personality Assessment*, *98*(3), 298-309.
- Bardeen, J. R., & Orcutt, H. K. (2011). Attentional control as a moderator of the relationship between posttraumatic stress symptoms and attentional threat bias. *Journal of Anxiety Disorders*, *25*(8), 1008-1018.

- Bardeen, J. R., & Stevens, E. N. (2015). Sex differences in the indirect effects of cognitive processes on anxiety through emotion regulation difficulties. *Personality and Individual Differences, 81*, 180-187.
- Bigman, Y. E., Mauss, I. B., Gross, J. J., & Tamir, M. (2016). Yes I can: Expected success promotes actual success in emotion regulation. *Cognition and Emotion, 30*(7), 1380-1387.
- Bonanno, G. A., Papa, A., Lalande, K., Westphal, M., & Coifman, K. (2004). The importance of being flexible the ability to both enhance and suppress emotional expression predicts long-term adjustment. *Psychological Science, 15*(7), 482-487.
- Bornovalova, M. A., Gratz, K. L., Daughters, S. B., Nick, B., Delany-Brumsey, A., Lynch, T. R., Kosson, D., & Lejuez, C. W. (2008). A multimodal assessment of the relationship between emotion dysregulation and borderline personality disorder among inner-city substance users in residential treatment. *Journal of Psychiatric Research, 42*(9), 717-726.
- Brandon, T. H., Herzog, T. A., Juliano, L. M., Irvin, J. E., Lazev, A. B., & Simmons, V. N. (2003). Pretreatment task persistence predicts smoking cessation outcome. *Journal of Abnormal Psychology, 112*(3), 448-456.
- Caprara, G. V., Fida, R., Vecchione, M., Del Bove, G., Vecchio, G. M., Barbaranelli, C., & Bandura, A. (2008). Longitudinal analysis of the role of perceived self-efficacy for self-regulated learning in academic continuance and achievement. *Journal of Educational Psychology, 100*(3), 525.
- Catanzaro, S. J., Backenstrass, M., Miller, S. A., Mearns, J., Pfeiffer, N., & Brendalen, S. (2014). Prediction of symptoms of emotional distress by mood regulation expectancies and affective traits. *International Journal of Psychology, 49*(6), 471-479.

- Catanzaro, S. J. & Mearns, J. (1990). Measuring generalized expectancies for negative mood regulation: Initial scale development and implications. *Journal of Personality Assessment, 54*(3-4), 546-563.
- Catanzaro, S.J. & Mearns, J. (1999). Mood-related expectancy, emotional experience, and coping behavior. In I. Kirsch (Ed.), *How expectancies shape experience* (pp. 67-91). Washington, DC: American Psychological Association.
- Coffey, K. A., Hartman, M., & Fredrickson, B. L. (2010). Deconstructing mindfulness and constructing mental health: Understanding mindfulness and its mechanisms of action. *Mindfulness, 1*(4), 235-253.
- Conklin, H. M., Curtis, C. E., Katsanis, J., & Iacono, W. G. (2000). Verbal working memory impairment in schizophrenia patients and their first-degree relatives: Evidence from the digit span task. *American Journal of Psychiatry, 157*(2), 275-277.
- Crawford, J. R., & Henry, J. D. (2004). The Positive and Negative Affect Schedule (PANAS): Construct validity, measurement properties and normative data in a large non-clinical sample. *British Journal of Clinical Psychology, 43*(3), 245-265.
- Cronbach, L. J., & Furby, L. (1970). How we should measure "change": Or should we?. *Psychological Bulletin, 74*(1), 68.
- Daughters, S. B., Lejuez, C. W., Bornovalova, M. A., Kahler, C. W., Strong, D. R., & Brown, R. A. (2005). Distress tolerance as a predictor of early treatment dropout in a residential substance abuse treatment facility. *Journal of Abnormal Psychology, 114*(4), 729-734.
- Davis, R. N., Andresen, E. N., Trosko, M., Massman, P. J., & Lovejoy, M. C. (2005). Negative mood regulation (NMR) expectancies: A test of incremental validity. *Personality and Individual Differences, 39*(2), 263-270.

- DiMauro, J., Renshaw, K. D., & Kashdan, T. B. (2016). Beliefs in negative mood regulation and daily negative affect in PTSD. *Personality and Individual Differences, 95*, 34-36.
- Ellis, A. J., Fischer, K. M., & Beevers, C. G. (2010). Is dysphoria about being red and blue? Potentiation of anger and reduced distress tolerance among dysphoric individuals. *Cognition & Emotion, 24*(4), 596-608.
- Fergus, T. A., Bardeen, J. R., & Orcutt, H. K. (2013). Experiential avoidance and negative emotional experiences: The moderating role of expectancies about emotion regulation strategies. *Cognitive Therapy and Research, 37*(2), 352-362.
- Gratz, K. L., Bardeen, J. R., Levy, R., Dixon-Gordon, K. L., & Tull, M. T. (2015). Mechanisms of change in an emotion regulation group therapy for deliberate self-harm among women with borderline personality disorder. *Behaviour Research and Therapy, 65*, 29-35.
- Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the Difficulties in Emotion Regulation Scale. *Journal of Psychopathology and Behavioral Assessment, 26*(1), 41-54.
- Gratz, K. L., Rosenthal, M. Z., Tull, M. T., Lejuez, C. W., & Gunderson, J. G. (2006). An experimental investigation of emotion dysregulation in borderline personality disorder. *Journal of Abnormal Psychology, 115*(4), 850-855.
- Greiffenstein, M. F., Baker, W. J., & Gola, T. (1994). Validation of malingered amnesia measures with a large clinical sample. *Psychological Assessment, 6*(3), 218.
- Gross, J. J. (1998). Antecedent-and response-focused emotion regulation: Divergent consequences for experience, expression, and physiology. *Journal of Personality and Social Psychology, 74*(1), 224-237.

- Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology, 85*(2), 348-362.
- Gross, J. J., & Thompson, R. A. (2007). Emotion regulation: Conceptual foundations. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 3-24). New York: Guilford Press.
- Guay, F., Marsh, H. W., & Boivin, M. (2003). Academic self-concept and academic achievement: Developmental perspectives on their causal ordering. *Journal of Educational Psychology, 95*(1), 124-136.
- Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs, 76*(4), 408-420.
- Hayes, A.F. (2012). PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling [White paper]. Retrieved from <http://www.afhayes.com/public/process2012.pdf>
- IBM Corp (2016). IBM SPSS Statistics for Windows, Version 23.0 [Computer software]. Armonk, NY: IBM Corp.
- Jasinski, L. J., Berry, D. T., Shandera, A. L., & Clark, J. A. (2011). Use of the Wechsler Adult Intelligence Scale Digit Span subtest for malingering detection: A meta-analytic review. *Journal of Clinical and Experimental Neuropsychology, 33*(3), 300-314.
- Kashdan, T. B., Zvolensky, M. J., & McLeish, A. C. (2008). Anxiety sensitivity and affect regulatory strategies: Individual and interactive risk factors for anxiety-related symptoms. *Journal of Anxiety Disorders, 22*(3), 429-440.

- Kassel, J. D., Bornovalova, M., & Mehta, N. (2007). Generalized expectancies for negative mood regulation predict change in anxiety and depression among college students. *Behaviour Research and Therapy, 45*(5), 939-950.
- Keuthen, N. J., Rothbaum, B. O., Welch, S. S., Taylor, C., Falkenstein, M., Heekin, M., ... & Jenike, M. A. (2010). Pilot trial of dialectical behavior therapy-enhanced habit reversal for trichotillomania. *Depression and Anxiety, 27*(10), 953-959.
- Kirsch, I., Mearns, J., & Catanzaro, S. J. (1990). Mood-regulation expectancies as determinants of dysphoria in college students. *Journal of Counseling Psychology, 37*(3), 306-312.
- Koff, E., & Lucas, M. (2011). Mood moderates the relationship between impulsiveness and delay discounting. *Personality and Individual Differences, 50*(7), 1018-1022.
- Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (2005). *International affective picture system (IAPS): Affective ratings of picture and instruction manual* (Technical report A-6). Gainesville, FL: University of Florida.
- Lejuez, C. W., Kahler, C. W., & Brown, R. A. (2003). A modified computer version of the Paced Auditory Serial Addition Task (PASAT) as a laboratory-based stressor. *The Behavior Therapist, 26*(4), 290-293.
- Lichtenberger, E. O., & Kaufman, A. S. (2009). *Essentials of WAIS-IV assessment* (Vol. 50). John Wiley & Sons.
- Mearns, J. (1991). Coping with a breakup: Negative mood regulation expectancies and depression following the end of a romantic relationship. *Journal of Personality and Social Psychology, 60*(2), 327-344.
- Mehrotra, S., & Tripathi, R. (2012). Affect intensity and negative mood regulation (NMR) expectancies: A preliminary Indian study. *Asian Journal Of Psychiatry, 5*(2), 137-143.

- Mischel, W., Cantor, N., Feldman, S. (1996). Principles of self-regulation: The nature of willpower and self-control. In E.T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 329-360). New York: The Guilford Press.
- Mischel, W., & Shoda, Y. (1995). A cognitive-affective system theory of personality: Reconceptualizing situations, dispositions, dynamics, and invariance in personality structure. *Psychological Review*, *102*(2), 246-268.
- Nolen-Hoeksema, S. (2012). Emotion regulation and psychopathology: The role of gender. *Annual Review of Clinical Psychology*, *8*, 161-187.
- Nolen-Hoeksema, S., & Aldao, A. (2011). Gender and age differences in emotion regulation strategies and their relationship to depressive symptoms. *Personality and Individual Differences*, *51*(6), 704-708.
- Odou, N., & Brinker, J. (2015). Self-compassion, a better alternative to rumination than distraction as a response to negative mood. *The Journal of Positive Psychology*, *10*(5), 447-457.
- Passarotti, A. M., Trivedi, N., & Patel, M. (2016). Executive function in adolescent bipolar disorder with and without ADHD comorbidity. *Bipolar Disorder: Open Access*.
- Perez, J., Venta, A., Garnaat, S., & Sharp, C. (2012). The Difficulties in Emotion Regulation Scale: Factor structure and association with nonsuicidal self-injury in adolescent inpatients. *Journal of Psychopathology and Behavioral Assessment*, *34*(3), 393-404.
- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, *40*(3), 879-891.

- Pretz, J. E., Tetz, K. S., & Kaufman, S. B. (2010). The effects of mood, cognitive style, and cognitive ability on implicit learning. *Learning and Individual Differences, 35*, 215-219.
- Rusting, C. L., & Larsen, R. J. (1997). Extraversion, neuroticism, and susceptibility to positive and negative affect: A test of two theoretical models. *Personality and Individual Differences, 22*(5), 607-612.
- Salsman, N. L., & Linehan, M. M. (2012). An investigation of the relationships among negative affect, difficulties in emotion regulation, and features of borderline personality disorder. *Journal of Psychopathology and Behavioral Assessment, 34*(2), 260-267.
- Schneider, F., Gur, R. C., Gur, R. E., & Muenz, L. R. (1994). Standardized mood induction with happy and sad facial expressions. *Psychiatry Research, 51*(1), 19-31.
- Schönfeld, P., Brailovskaia, J., Bieda, A., Zhang, X. C., & Margraf, J. (2016). The effects of daily stress on positive and negative mental health: Mediation through self-efficacy. *International Journal of Clinical and Health Psychology, 16*(1), 1-10.
- Schroeder, R. W., Twumasi-Ankrah, P., Baade, L. E., & Marshall, P. S. (2012). Reliable digit span: A systematic review and cross-validation study. *Assessment, 19*(1), 21-30.
- Shepherd-McMullen, C., Mearns, J., Stokes, J. E., & Mechanic, M. B. (2015). Negative mood regulation expectancies moderate the relationship between psychological abuse and avoidant coping. *Journal of Interpersonal Violence, 30*(9), 1553-1566.
- Sheppes, G., Suri, G., & Gross, J. J. (2015). Emotion regulation and psychopathology. *Annual Review of Clinical Psychology, 11*, 379-405.
- Sobel, M. E. (1987). Direct and indirect effects in linear structural equation models. *Sociological Methods & Research, 16*(1), 155-176.

- Steinberg, M. L., & Williams, J. M. (2013). State, but not trait, measures of persistence are related to negative affect. *Journal of Studies on Alcohol and Drugs*, 74(4), 584–588.
- Strong, D. R., Lejuez, C. W., Daughters, S., Marinello, M., Kahler, C. W., & Brown, R. A. (2003). The computerized mirror tracing task, version 1. *Unpublished manual*.
- Tamir, M., & Bigman, Y. E. (in press). Expectations influence how emotions shape behavior. *Emotion*.
- Tamir, M., & Mauss, I. B. (2011). Social cognitive factors in emotion regulation: Implications for well-being. In I. Nyklicek, A. Vingerhoets, M. Zeelenberg, & J. Donellet (Eds.), *Emotion Regulation and Well-Being* (pp. 31-47) Berlin, Germany: Springer.
- Tian, Q., Simonsick, E. M., Resnick, S. M., Shardell, M. D., Ferrucci, L., & Studenski, S. A. (2015). Lap time variation and executive function in older adults: The Baltimore Longitudinal Study of Aging. *Age and Ageing*, 44(5), 796-800.
- Tucker, L. R., Damarin, F., & Messick, S. (1966). A base-free measure of change. *Psychometrika*, 31, 457–473.
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063-1070.
- Wechsler D. (2008). *WAIS-IV administration and scoring manual*. San Antonio, TX: Psychological Corporation.
- Werner, K., & Gross, J. J. (2010). Emotion regulation and psychopathology: A conceptual framework. In A. M. Kring & D. M. Sloan (Eds.), *Emotion regulation and psychopathology: A transdiagnostic approach to etiology and treatment* (pp. 13-37). New York: Guilford Press

Westphal, M., Seivert, N. H., & Bonanno, G. A. (2010). Expressive flexibility. *Emotion, 10*(1), 92-100.

Whiteside, U., Chen, E., Neighbors, C., Hunter, D., Lo, T., & Larimer, M. (2007). Difficulties regulating emotions: Do binge eaters have fewer strategies to modulate and tolerate negative affect? *Eating Behaviors, 8*(2), 162-169.

Williams, S. L., Kinney, P. J., & Falbo, J. (1989). Generalization of therapeutic changes in agoraphobia: The role of perceived self-efficacy. *Journal of Consulting and Clinical Psychology, 57*(3), 436.

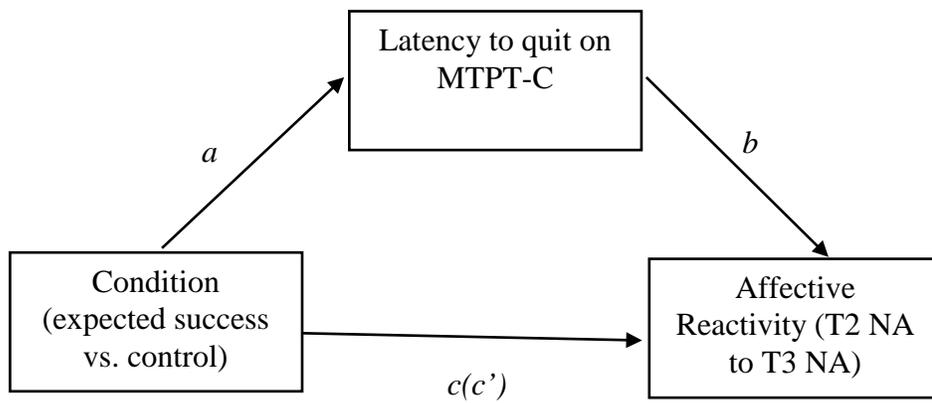


Figure 1. Proposed model of mediation.

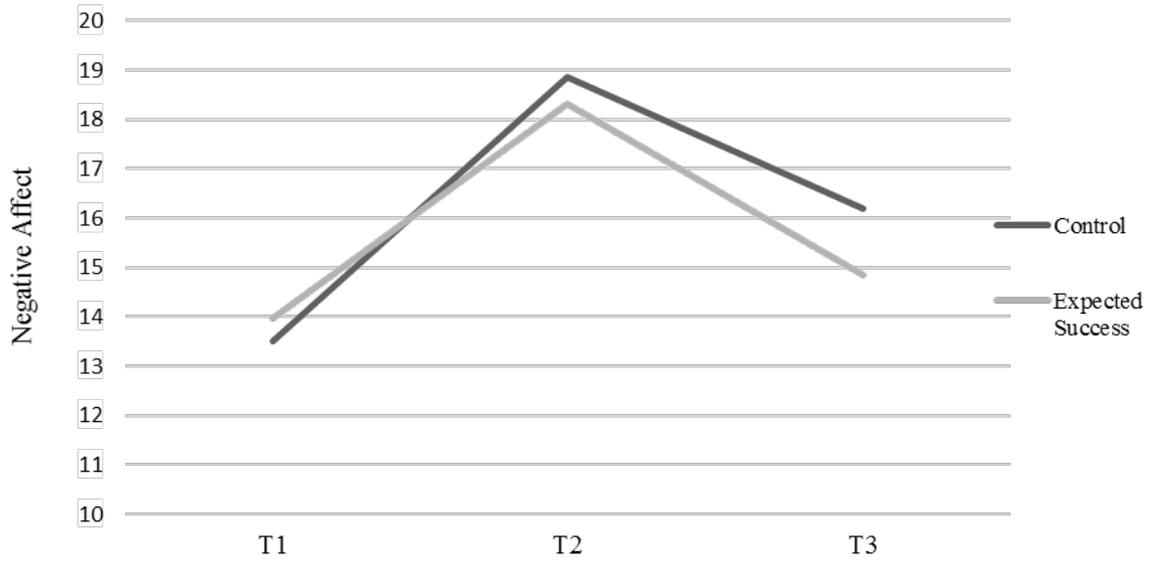


Figure 2. Estimated marginal means of negative affect across T1, T2, and T3 by condition, covarying for age and sex.