

Emotion Malleability Beliefs Influence the Spontaneous Regulation of Social Anxiety

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Abstract The current study examined how manipulating individuals' beliefs about emotion's malleability influences the choices they make in how they spontaneously regulate their anxiety during a stressful social situation. Participants were randomly assigned to receive either an experimental manipulation that emotions are malleable or that emotions are fixed then completed an impromptu, brief speech task designed to elicit anxiety. We predicted that participants in the malleable emotion condition, compared to those in the fixed condition, would engage in more cognitive reappraisal to change the unfolding of an emotion earlier in the emotion generative process; we predicted that participants in the fixed emotion condition would engage in more expressive suppression, a late stage regulation strategy. Consistent with these predictions, participants in the malleable condition reported spontaneously engaging in more cognitive reappraisal during the stressful speech task, although this greater use of reappraisal was not significantly associated with a decrease in negative affect. These results suggest that beliefs about emotion malleability can systematically influence subsequent emotion regulatory behavior.

Keywords Emotion belief · Emotion regulation · Social anxiety · Stress

Introduction

Public speaking represents one of the most feared situations in both healthy individuals and clinical populations (Kendler et al. 2001; Pull 2012). In separate community surveys, approximately one-third of respondents reported experiencing excessive anxiety when speaking in public (Kessler et al. 1998; Pull 2012; Stein et al. 1996). This social anxiety occurs for both genders, but is often more pronounced in women (Carrillo et al. 2001; Moscovitch et al. 2005). Moreover, research comparing the experience of public speaking stress in individuals with and without social anxiety disorder finds that both groups can share a remarkably similar pattern of responding, specifically in their physiological reactivity and perceived distress (Jamieson et al. 2013b; Mauss et al. 2004). In clinical populations, approximately 15–30 % of patients diagnosed with social anxiety disorder describe public speaking as their area of primary concern, making this consistently the most common area of fear amongst individuals with a social anxiety disorder diagnosis (Kessler et al. 1998; Ruscio et al. 2008; Stein et al. 2000). Therefore, understanding factors that can enhance the regulation of anxiety in social performance situations is important because the fear of public speaking is both common and debilitating.

Because presenting participants with a public speaking task is so generally threatening, it elicits attempts to regulate emotion, potentially involving the use of different regulation strategies (e.g., Kirschbaum et al. 1993). Nevertheless, because of the unique and imminent demands of the task, such emotion regulation efforts may have limited

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success; despite engaging in these regulatory efforts, individuals often still feel increased levels of negative affect and anxiety when completing an impromptu speech task (Kross et al. 2014). Examining factors that causally influence the use of specific strategies in these social evaluation situations (Jamieson et al. 2012) is important given the prominent role of emotion dysregulation in modern conceptualizations of psychopathology (see Jazaieri et al. 2013; Gross and Jazaieri 2014; Sheppes et al. 2015 for reviews). Understanding how certain emotion regulation strategies are associated with differential outcomes in these healthy samples can potentially speak to the emotion regulation deficits or dysfunction in individuals at the severe end of the social anxiety spectrum who have been formally diagnosed with social anxiety disorder (McNeil 2001).

Cognitive reappraisal and expressive suppression have received considerable empirical and clinical attention in relation to social stress. Cognitive reappraisal refers to reframing a negative situation or emotion-eliciting stimulus in a less emotional, more neutral light (Gross 1998). Cognitive reappraisal is generally seen as an antecedent-focused emotion regulation strategy that acts on the emotion as it is unfolding. Reappraisal is an especially effective strategy for handling social stress because theoretical models of stress see negative appraisals as a key component to the experience of this negative affective state (Blascovich et al. 1999). Individuals in stressful social evaluation situations can benefit from reappraising stress as a resource or motivational tool, and the use of cognitive reappraisal can enhance performance in public speaking tasks (Jamieson et al. 2010, 2012, 2013a).

By contrast, the use of expressive suppression, defined as decreasing the outward emotional expression, has been tied to worse outcomes during stressful speech tasks (Gross 1998, 2002). Specifically, individuals who used expressive suppression during a speech task experienced the undesired amplification of the negative emotion, displayed a more pronounced physiological distress response, felt more subjective distress, and additionally demonstrated worse performance on the speech itself (Gross 1998; Hofmann et al. 2009). The current study examined a potential factor, namely beliefs about emotion malleability, that could influence spontaneous emotion regulatory behavior during a stressful speech task.

Beliefs about whether a quality is malleable (incremental theories) or fixed (entity theories) influence individuals' regulatory behavior and can have broad impact on individuals' perceptions and motivations (Dweck 2000; Dweck and Leggett 1988). Because entity theorists believe that a specific attribute is fixed and outside personal control, they believe that a challenge cannot be overcome through additional, active effort; are more likely to

disengage from a challenging situation; and are more likely to blame themselves for failure (Dweck and Leggett 1988; Hong et al. 1999). By contrast, incremental (or malleable) theorists, who believe that a specific attribute is changeable and dynamic, exhibit a more active regulatory orientation and a more assertive pattern of coping (Dweck and Leggett 1988; Tamir et al. 2007). For transient states, such as emotions, fixed and malleable beliefs refer to the perceived possibility of changing the course of the specific state in a given moment, whereas for more enduring trait characteristics, holding a fixed versus malleable belief refers to the perception that an individual cannot change this quality across time.

Correlational work found that assessed (as opposed to manipulated) trait-level emotion theories related to how participants tended to regulate their negative emotions, and ultimately how successful they were in these efforts. Gross and Thompson (2007) hypothesized that individuals who believe that emotion is malleable will be more likely to engage in emotion regulation strategies, such as cognitive reappraisal, that change the emotion as it is unfolding. Consistent with this hypothesis, empirical work reveals that holding more trait-level malleable emotion beliefs correlates with the greater trait use of cognitive reappraisal, fewer depressive symptoms, and lower levels of negative affect (Kappes and Schikowski 2013; Tamir et al. 2007). In addition, De Castella et al. (2013) found that the use of cognitive reappraisal mediated the relationship between emotion malleability beliefs and psychological wellbeing, demonstrating that emotion regulatory behavior could be the pathway through which emotion malleability beliefs relate to psychological health. Taken together, these findings emphasize the importance of targeting beliefs about emotion's malleability to increase the use of regulatory strategies, such as cognitive reappraisal, which have been tied to effective emotion regulation.

Past work on emotion malleability beliefs and emotion regulation has focused almost exclusively on correlations between trait emotion malleability beliefs and emotion regulation tendencies and affective outcomes. To directly examine whether emotion malleability beliefs causally influence the spontaneous use of strategies, such as reappraisal, to regulate unwanted social stress, participants in the current experiment were randomly assigned to conditions presenting the argument that emotions are malleable or that emotions are fixed and then all participants completed an impromptu speech task designed to elicit social stress. Participants completed self-report measures assessing their anxiety and affect before and after the speech and the emotion regulation strategies they used to cope with their unwanted emotions during the speech task.

The present work focused on two primary emotion regulation strategies, cognitive reappraisal and expressive

suppression, that have received substantial empirical attention in the study of regulatory behavior in social anxiety (Hofmann et al. 2009; Jamieson et al. 2013a) and in research on the associations between emotion malleability beliefs and regulatory behavior (Tamir et al. 2007; Schroder et al. 2014). Reappraisal and suppression are key factors in psychological health and can shape an individual's experience of social anxiety (Aldao et al. 2010).

Drawing on past work examining trait emotion beliefs, we predicted that inducing individuals to view their emotions as malleable would incline them to engage in cognitive reappraisal, an antecedent-focused emotion regulation strategy that acts on the emotion as it unfolds. We also predicted that participants who were influenced to see their emotions as fixed would be more likely to engage in expressive suppression during the speech task because expressive suppression only acts on emotion once it is fully felt, in line with the view that emotions are fixed entities. Based on past work, we predicted that women would higher overall levels of social anxiety prior to the speech task than men. However, we did not predict gender differences in emotion malleability beliefs because past work in this domain has not found significant gender differences in emotion malleability beliefs (e.g., Tamir et al. 2007).

As a secondary focus, we also predicted that participants in the fixed experimental condition would engage in more rumination, cognitive suppression, and passive acceptance of their emotions during the speech task because these strategies primarily act to regulate an emotion only once it has fully emerged. On an exploratory basis, we also predicted that individuals in the “emotion is fixed” condition would be more likely to engage in positive refocus to distract themselves during the speech in order to avoid engagement with their negative emotions that they view as uncontrollable. Based on work in implicit theories of intelligence, we also predicted that individuals in the fixed manipulation condition would be more likely to engage spontaneously in self-blame for their emotional upset (Dweck 2000; Dweck and Leggett 1988). Because these strategies appear less relevant to and are difficult to implement in this type of time-limited stressful social performance task, we did not anticipate differences in the use of these emotion regulation strategies.

We also examined associations between the use of each strategy and changes in anxiety and positive and negative affect as a function of the experimental manipulation. Specifically, we predicted that individuals in the “emotion is malleable” experimental condition would report less of a decrease in positive affect and less of an increase in negative affect and anxiety. In relation to our primary emotion regulation strategies of interest, we predicted that individuals who received the emotion malleability manipulation would report more benefits in terms of change in affect

(e.g., less reduction in positive affect and less increase in negative affect and anxiety) the more they used reappraisal.

Method

Participants

Participants were undergraduate students enrolled in an undergraduate psychology course ($n = 35$) and members of the greater New Haven community ($n = 65$). Participants were compensated by receiving 1 h of course credit or \$10 if they were drawn from the community. Of the 100 participants who initially completed the study, five participants (5.0 %) were excluded because they did not complete the speech task that was an essential feature of the study. Additionally, 6 (6.0 %) participants were excluded because they guessed the study's purpose during the funneled debriefing procedure. Ten participants were excluded from the “emotion is malleable” experimental group and one participant was excluded from the “emotion is fixed” experimental group. This proportion of participants excluded is in line with past work assessing awareness of subtle manipulations through the use of a funneled debriefing procedure (Bargh and Chartrand 2000).

After exclusions, the final analyzed sample consisted of 89 individuals, 59 (67.0 %) of whom were women. Thirty participants were undergraduates and 59 participants were drawn from the surrounding community. The average age of the final sample was 21.6 ($SD = 4.19$, range 18–46 years). Self-reported ethnicities were: 43 (48.3 %) White, 10 (11.2 %) African American/Black, 16 (18.0 %) Asian or Pacific Islander, 6 (6.7 %) Latino/Hispanic, and 14 (15.7 %) Multiracial. There were no group differences at baseline in terms of age, gender, race or emotion malleability beliefs. There was no consistent effect of participant type (student or community) on any of the outcome variables (all p 's > 0.08), and therefore this variable was excluded from the main analyses.

Measures

Participants' baseline state affect was initially assessed prior to the emotion belief manipulation and the speech task. Participants completed the six-item version of the state anxiety scale of the State-Trait Anxiety Inventory (STAI-S; Marteau and Bekker 1992). The scale had good internal consistency ($\alpha = 0.83$). Participants also completed the 20-item Positive and Negative Affect Scale (PANAS) that assessed their affect “during the past week” to serve as a measure of baseline affect (Tellegen et al. 1988). Reliability for the PANAS Negative Affect and Positive Affect subscales was good ($\alpha = 0.84$ and 0.88,

respectively). In addition, participants' trait emotion malleability beliefs were assessed using the Implicit Theories of Emotion scale (Tamir et al. 2007). The Implicit Theories of Emotion Scale (ITES) was developed by Tamir and colleagues and consists of four items (e.g., "If they want to, people can change the emotions they have"). Scores were calculated through reverse-scoring two items and calculating the average of the four items. Higher scores indicated more malleable emotion beliefs and the scale possessed good internal consistency ($\alpha = 0.86$). In addition, all participants completed the eight-item version of the Brief Fear of Negative Evaluation (BFNE-S) scale to assess their trait-level social anxiety ($\alpha = 0.95$; Carleton et al. 2006; Leary 1983). We also measured participants' trait-level coping self efficacy using the Coping Self Efficacy Scale (CSE) (Chesney et al. 2006) that has been used to measure confidence in the ability to engage in coping behaviors and possessed excellent internal consistency ($\alpha = 0.94$). We were interested in measuring participants' trait-level self-efficacy prior to undergoing any manipulation in order to examine any interactions between self-efficacy and the emotion belief manipulation. Total scores for these two scales were calculated. Participants also completed the Emotion Regulation Questionnaire (ERQ; $\alpha = 0.87$ for the reappraisal subscale and $\alpha = 0.84$ for the expression suppression subscale; Gross 2002) to assess their general inclination to engage in cognitive reappraisal and expressive suppression before undergoing the emotion malleability belief manipulation. Summed scores for each emotion regulation strategy subscale were calculated.

After undergoing the emotion belief manipulation and completing the speech stress task, all participants completed questionnaires assessing their use of specific emotion regulation strategies during the speech task and all participants also completed the affect and anxiety scales for a second time. To assess cognitive reappraisal and expressive suppression used during the speech, we utilized a state-version of the Emotion Regulation Questionnaire (ERQ) that was modified for the current study. The main change from the original version of this scale was that we changed the tense of the individual items; for example, an original ERQ item to assess the general use of reappraisal reads: "I control my emotions by *changing the way I think* about the situation I'm in," and in the current study, this item was modified to read: "I controlled my emotions by *changing the way I thought about the situation I was in.*" A sample item to assess expressive suppression on the ERQ was modified from "I control my emotions by *not expressing them*" to "I controlled my emotions by *not expressing them.*" A modified, shortened version of the ERQ has been previously utilized to assess the spontaneous use of cognitive reappraisal and expressive suppression, which were emotion regulation strategies of primary

interest in the current study (Ehring et al. 2010). Internal consistency for the reappraisal subscale was excellent ($\alpha = 0.93$) and adequate for the expressive suppression subscale ($\alpha = 0.71$). Individual subscales were created by adding the individual items within each subscale.

Participants completed selected subscales from a state version of the Cognitive Emotion Regulation Questionnaire (CERQ), adapted from the trait version (Garnefski et al. 2001) that assessed their use of the emotion regulation strategies of secondary, more exploratory interest: self-blame, acceptance, rumination, and positive refocus. Internal consistencies for these subscales were good overall (α 's ranged from 0.77 to 0.80). As discussed earlier, we also had an exploratory interest in the degree to which state emotion malleability beliefs would influence the spontaneous use of cognitive suppression. Cognitive suppression was assessed using an adapted state version of the White Bear Suppression Inventory (WBSI; Wegner and Zanakos 1994). The WBSI demonstrated excellent internal consistency ($\alpha = 0.93$), and a total score was generated from adding together individual items. We adapted the WBSI and the selected subscales from the CERQ for the current study because the vast majority of self-report emotion regulation scales assess trait-level use of these strategies. However, there is precedent for utilizing adapted trait emotion regulation scales to assess spontaneous use of emotion regulation (Egloff et al. 2006; Ehring et al. 2010; Gruber et al. 2012). The same procedure used to adapt the ERQ was used to adapt the CERQ and the WBSI, specifically we changed the tense and how the questionnaire was framed in order to clarify that participants should complete these scales when thinking about regulatory strategies they used during the speech task. For example, an item of the CERQ, "I often think about how I feel about what I have experienced," was adapted to read, "I often thought about what I was experiencing"; similarly, an original item on the WBSI, "There are some things I prefer not to think about," was revised to state, "There were some things I preferred not to think about." As demonstrated earlier, the state emotion regulation scales used in the current study demonstrated good to excellent internal reliability. Scores for each subscale were created by adding the individual items contained within each subscale.

Participants also completed the PANAS to assess their affect "during the speech task." Internal consistency for this second administration of the PANAS was excellent for the Positive Affect scale ($\alpha = 0.92$) and good for the Negative Affect scale ($\alpha = 0.83$). Participants again completed the STAI assessing their anxiety while taking the speech. Internal consistency for this administration was good ($\alpha = 0.83$). Scores for these measures were created by adding the individual items together.

Participant videos ($n = 83$) were coded by two independent coders, unaware of the study's purpose. Due to technical difficulties with the audio or video recordings of five of the participant speeches, 83 were coded for analysis. Each coder rated the videos on six items taken from the Speech Performance Scale (Rapee and Lim 1992). These items were rated on a 0—(*not at all*) to 4—(*very much*) scale and the items assessed the degree to which the participant stuttered, maintained eye contact, paused, seemed nervous, seemed confident, and generally spoke well. Interrater reliability was adequate to excellent (α 's ranging from 0.73 to 1.00).

Procedure

The Institutional Review Board of the Psychology department at Yale University approved the current study's protocol. After completing the baseline measures described above, participants were randomly assigned to receive the "emotion is malleable" passage (the malleable condition; $n = 41$) or the "emotion is fixed" passage (the fixed condition; $n = 48$). The passages were each approximately one page, single-spaced in length and presented fictitious data and quotations to convey the argument either that emotions are fixed or that emotions are malleable. For example, participants in the malleable manipulation condition read: "Emotion is not set in stone: it can be changed. Everyone has it in their power to change their emotions and how these emotions are expressed," whereas participants in the fixed manipulation condition read: "Emotion is set in stone, meaning it cannot be changed." The passages were of similar length (the "emotion is malleable" passage was 707 words and the "emotion is fixed" passage was 838 words). Participants were then given 5 min to summarize the argument of their specific manipulation passage as if describing it to a peer. This process has been used successfully to aid in the internalization of subtle manipulations (Walton and Cohen 2011) and also took advantage of the "saying is believing" effect to enhance the internalization of the arguments presented in the specific manipulation passage (Echterhoff et al. 2005).

We developed and validated this experimental manipulation of emotion malleability beliefs in a separate, pilot study that used the same experimental passage to promote a more malleable view of emotion. This study included a manipulation check in which participants were asked to read three separate vignettes in which individuals were experiencing strong negative emotions and participants were asked to what degree they believed that those individuals could change the emotions they were experiencing. Compared to the control condition, we found that individuals who received the malleability manipulation believed that the individuals in the vignettes could change

their emotions ($B = 0.328$, $SE = 0.146$, $\beta = 0.181$, $p = 0.023$). The implicit manipulation check was not included in the current study in order to reduce the likelihood that participants would discern the true purpose of the study.

Immediately after reading and summarizing their respective manipulation passages, all participants underwent a modified version of the impromptu speech task from the Trier Social Stress Task (Kirschbaum et al. 1993). During this stressful speech task, all participants were given 90 s to prepare a brief, 2-min speech on "why you are a good friend." This paradigm has been shown to consistently produce subjective feelings of anxiety (Fredrickson and Levenson 1998; Fredrickson et al. 2000; Jamieson et al. 2012). Next, all participants gave their 2-min speech facing a mounted video camera that video and audio recorded their speech. All participants were told that their speeches would be watched by study investigators in order to further enhance their feelings of social stress.

Immediately following the speech task, participants completed several measures to assess their spontaneous use of specific emotion regulation strategies and also completed the measures of anxiety and positive and negative affect. Before completing each emotion regulation measure, participants were prompted to answer thinking about how they regulated their emotions during the speech task. At the study's conclusion, all participants completed an adapted version of the funneled debriefing procedure (provided in supplemental materials) described in Bargh and Chartrand (2000) that has been used to probe participants' awareness of subtle experimental manipulations and to ascertain if demand effects could play a role in the study's results. Also at the study's conclusion, all participants were debriefed on the study's purpose.

Statistical Analyses

We used three 2 (experimental group) \times 2 (pre-post affect measure) analyses of variance (ANOVA's) to assess changes in participants' anxiety and positive and negative affect as a function of the speech task in order to ensure that the speech task led to the desired amplification of anxiety and negative affect and decrease in positive affect. For our main analyses examining group differences in emotion regulatory behavior, we used a series of analyses of covariance (ANCOVA's.) We included participants' trait emotion malleability beliefs as a covariate in these analyses in order to focus on the state effects of the malleability manipulation on spontaneous emotion regulation behavior above and beyond participants' pre-existing emotion malleability beliefs. We entered gender and experimental groups as fixed factors in these analyses. For

examining changes in affect, we conducted a series of regression analyses predicting changes in anxiety, negative affect, and positive affect from baseline by participants' self-reported use of emotion regulation strategies, Fixed versus Malleable emotion condition, and the interaction (based on the centered continuous variable). To parallel the main analyses examining participants' spontaneous emotion regulation, we also included gender and emotion malleability beliefs as predictors in these regressions examining changes in affect. We also conducted a series of ANOVA's with experimental group as the fixed factor in order to examine any group differences in behavior during the speech based on the behavioral coding by the two independent coders.

Results

Affect Checks

We used a 2 (experimental group) \times 2 (pre-post affect measure) ANOVA to assess changes in participants' anxiety and positive and negative affect as a function of the speech task. There were no effects of fixed/malleable manipulation on changes in participants' anxiety, positive, or negative affect (p 's $>$ 0.25). Participants' state anxiety, as measured by the STAI, significantly increased from baseline ($M = 11.6$, $SD = 3.7$) to after the speech task ($M = 12.9$, $SD = 3.7$), $F(1, 81) = 10.93$, $\eta_p^2 = 0.17$, 90 % CI [0.03, 0.23], $p = 0.001$.¹ As expected, participants' positive affect (as assessed by the PANAS) decreased from baseline ($M = 33.54$, $SD = 7.39$) to post-speech ($M = 23.35$, $SD = 8.67$), $F(1, 86) = 105.72$, $\eta_p^2 = 0.55$, 90 % CI [0.43, 0.63], $p < 0.001$. In addition, there were no group differences in pre-speech anxiety ($p = 0.86$). Additionally, there was a significant decrease in negative affect generally from pre to post speech, as assessed by the Negative Affect scale of the PANAS, $F(1, 86) = 29.31$, $\eta_p^2 = 0.25$, 90 % CI [0.13, 0.37], $p < 0.001$. Correlations between the study's variables and the affect measures are presented on Table 1.

Main Analyses

We conducted two 2 (experimental condition) \times 2 (gender) ANCOVA's to examine the effects of malleability manipulation on the two primary emotion regulation strategies, cognitive reappraisal and expressive suppression (see Table 2). We included participants' trait emotion malleability beliefs as a covariate in these analyses in order

to focus on the state effects of the malleability manipulation on spontaneous emotion regulation behavior above and beyond participants' pre-existing emotion malleability beliefs. We entered gender as a fixed factor in these analyses given past work that has consistently found gender differences in levels of social anxiety (e.g., Moscovitch et al. 2005; Turk et al. 1998). In the current study's sample, a gender difference also emerged, with women reporting higher trait social anxiety ($M = 25.22$, $SD = 7.85$) compared to males, $M = 20.86$, $SD = 8.26$, $F(1, 86) = 5.80$, $\eta_p^2 = 0.06$, 90 % CI [0.01, 0.16], $p = 0.02$. There was no consistent effect of gender, race, or age on the dependent variables and there were no gender differences in trait emotion malleability beliefs ($F(1, 86) = 0.87$, $\eta_p^2 = 0.01$, 90 % CI [0.00, 0.07], $p = 0.35$).

We first examined separately the effect of manipulating participants' emotion malleability beliefs on their spontaneous use cognitive reappraisal and expressive suppression during the stressful speech task. As expected, we found a significant effect of the malleability manipulation on the use of cognitive reappraisal, $F(1, 81) = 4.87$, $\eta_p^2 = 0.06$, 90 % CI [0.00, 0.15], $p = 0.03$.² This analysis for cognitive reappraisal remained significant when gender was not entered as a fixed factor, $F(1, 84) = 4.42$, $\eta_p^2 = 0.05$, 90 % CI [0.00, 0.14], $p = 0.04$. Specifically, as shown on Table 2, participants in the malleable manipulation condition reported more spontaneous use of reappraisal during the speech task ($M = 25.50$, $SD = 8.06$) compared to those participants in the fixed manipulation group ($M = 21.39$, $SD = 8.31$). No group differences emerged for the use of expressive suppression ($p = 0.30$). Trait use of cognitive reappraisal and expressive suppression did not moderate effect of the emotion belief manipulation on these outcome variables (p 's $>$ 0.74). In addition, there was no significant interaction between trait level emotion malleability beliefs and the emotion belief manipulation on any of the outcome variables (all p 's $>$ 0.05). We also measured cognitive suppression, self-blame, passive acceptance, positive refocus, and rumination as part of a larger study. We examined group differences in the use of these strategies on an exploratory basis and no significant group differences emerged for these analyses (p 's $>$ 0.19).

Changes in Affect

To supplement the previous analyses addressing our primary hypotheses about how manipulating emotion malleability beliefs affects reliance on different emotion regulation strategies, we also examined associations

¹ Decreased degrees of freedom in these analyses reflect missing data.

² The cognitive reappraisal analysis also remained significant when trait level emotion malleability beliefs was not included as a fixed factor, $F(1, 84) = 4.06$, $p = 0.04$.

Table 1 Descriptive statistics and correlations for main study variables

Scale	Mean	SD	Correlations										
			1	2	3	4	5	6	7	8	9	10	11
1. Trait emotion malleability beliefs	3.73	0.77	–	–0.12	0.09	–0.14	–0.24*	0.28*	0.06	0.03	0.09	0.01	–0.01
2. Negative affect—time 1	20.66	6.37	–0.12	–	0.11	0.39*	0.26*	–0.23*	–0.04	–0.13	0.27*	0.13	0.14
3. Positive affect—time 1	33.59	7.39	0.08	0.12	–	–0.40*	–0.35*	0.42*	0.31*	–0.14	–0.11	0.32*	–0.26*
4. Anxiety—time 1	11.68	3.69	–0.14	0.39*	–0.40*	–	0.37*	–0.26*	–0.13	0.07	0.16	–0.17	0.30*
5. Social anxiety (BFNE)	23.61	8.32	–0.24*	0.26*	–0.35*	0.37*	–	–0.42*	–0.16	0.29*	0.35*	–0.27*	0.44*
6. Coping self-efficacy	155.75	40.33	0.28*	–0.23*	0.42*	–0.26*	–0.42*	–	0.36*	–0.07	–0.18	0.20	–0.30*
7. Cognitive reappraisal	22.97	8.34	0.06	–0.04	0.31*	–0.13	–0.16	0.36*	–	0.31*	–0.09	0.42*	–0.23*
8. Expressive suppression	13.83	4.49	0.03	–0.13	–0.14	0.07	0.29*	–0.07	0.31*	–	0.21*	–0.15	0.30*
9. Negative affect—time 2	16.45	5.53	0.09	0.27*	–0.11	0.16	0.35*	–0.18	–0.09	0.21*	–	–0.18	0.72*
10. Positive affect—time 2	23.35	8.67	0.01	0.13	0.32*	–0.17	–0.27*	0.20	0.42*	–0.15	–0.18	–	–0.58*
11. Anxiety—time 2	13.76	3.98	–0.01	0.14	–0.26*	0.30*	0.44*	–0.30*	–0.23*	0.30*	0.72*	–0.58*	–

Negative and positive affect were measured using the PANAS at time 1 and time 2 and anxiety was measured using the STAI at time 1 and time 2. Cognitive reappraisal and expressive suppression were measured using the ERQ

* $p < 0.05$

Table 2 Emotion beliefs and emotion regulation strategies

Emotion regulation strategy	Mean	SE	F test
<i>Primary strategies</i>			
Cognitive reappraisal			4.87*
Malleable	25.50	1.34	
Fixed	21.38	1.29	
Expressive suppression			1.08
Malleable	14.71	0.73	
Fixed	13.65	0.71	

Means and standard errors (SE) are presented for the two experimental groups (malleable and fixed) and the F -statistic are presented for the between-group comparisons. In addition, we also measured rumination, self-blame, positive refocus, cognitive suppression, and acceptance on an exploratory basis and did not find group differences in the use of these strategies (p 's > 0.19)

* $p < 0.05$

between the use of each strategy and changes in anxiety and negative and positive affect as a function of the experimental manipulation. In particular, we conducted a series of regression analyses (see Table 3) predicting changes in anxiety, negative affect, and positive affect

from baseline by participants' self-reported use of emotion regulation strategies, Fixed versus Malleable emotion condition, and the interaction (based on the centered continuous variable). To parallel the main analyses examining participants' spontaneous emotion regulation, we also included gender and emotion malleability beliefs as predictors in these regressions examining changes in affect.

In terms of positive affect, there was a significant interaction between the experimental group and the use of reappraisal ($p = 0.01$). Specifically, the use of reappraisal was significantly associated with more of a decrease in positive affect as a result of the speech only for those participants in the fixed experimental group ($p = 0.01$) and not for those in the malleable experimental group ($p = 0.34$). With respect to negative affect and anxiety, reappraisal was associated, in general, with a greater decrease in anxiety from before to after the speech, but it is important to note that this effect was not statistically significant ($p = 0.16$). As shown on Table 3, the greater use of expressive suppression overall was related to more of an increase in negative affect from pre- to post-speech ($p = 0.001$). There was no significant interaction of experimental group and reappraisal use on changes in

Table 3 Emotion regulation strategies \times group and influences on affect

Emotion regulation strategy	<i>B</i>	<i>S</i>	<i>p</i> value	β	95 % CI
Expressive suppression—anxiety	0.24	0.15	0.12	0.29	−0.06–0.31
Suppression interaction—anxiety	−0.05	0.18	0.79	−0.05	−0.41–0.31
Reappraisal—anxiety	0.11	0.51	0.16	0.26	−0.05–0.28
Reappraisal interaction—anxiety	−0.13	0.83	0.24	−0.21	−0.33–0.08
Suppression—PA	0.06	0.43	0.88	0.03	−0.78–0.91
Suppression interaction—PA	−0.18	0.51	0.73	−0.07	−1.20–0.84
Reappraisal—PA	−0.20	0.20	0.33	−0.17	−0.60–0.20
Reappraisal interaction—PA	0.67	0.26	0.01*	0.44	−0.16–1.19
Fixed group	0.48	0.17	0.01*	−0.39	−0.56–0.20
Malleable group	−0.18	0.19	0.34	−0.16	0.13–0.83
Suppression—NA	1.00	0.30	<0.01	0.60	0.40–1.60
Suppression interaction—NA	−0.72	0.36	0.05	−0.35	−1.44–0.01
Reappraisal—NA	0.01	0.16	0.96	0.10	−0.31–0.33
Reappraisal interaction—NA	−0.08	0.02	0.70	−0.07	−0.49–0.33

Anxiety was measured using the STAI; PA refers to positive affect and NA to negative affect (as measured by the PANAS). Standardized betas (β), unstandardized beta weights (*B*), *p* values, and standard errors (*SE*) are presented for the overall use of specific emotion regulation strategies, the interactions of group and strategy use, and follow-up regressions within each experimental group for significant interactions

anxiety or negative affect ($p = 0.24$ and 0.69 , respectively).

In addition, we also examined the differential effect of emotion regulation strategy use and changes in anxiety and affect as a function of experimental group. As expected, the use of a more passive form of acceptance was associated with a greater increase in anxiety from baseline to the speech task ($p = 0.01$). Similarly, as expected, the greater use of rumination was associated with a greater increase in anxiety from baseline to the speech task ($p = 0.05$). There was a significant interaction between the experimental condition and the use of positive refocus ($p = 0.02$). Specifically, for those individuals in the malleable experimental condition, the main effect for the use of positive refocus was marginally significant ($p = 0.09$) in that the use of positive refocus was associated with more of an increase in anxiety; this effect was not significant in the fixed manipulation condition ($p = 0.67$).

To complement the analyses examining the effect of the experimental condition on changes in affect, we also examined (a) the relationship between participants' self-reported positive and negative affect during the speech and their performance giving the speech, as judged by the independent coders; and (b) whether the measures of speech performance differed as a function of the experimental condition. With respect the relationship between affect and performance, as summarized in Table 4, positive affect during the speech was positively correlated with more eye contact, fewer pauses higher ratings of perceived confidence, less nervousness as rated by the coders, and higher ratings of being well-spoken. By contrast, self-

reported anxiety during the speech was negatively associated with confidence as rated by the coders and positively correlated with nervousness.

With respect to the question about differences in performance as a function of the emotion malleability experimental condition, we conducted ANOVA's with experimental condition as the fixed factor to examine whether the emotion belief manipulation had an effect on participants' speech performance. Overall, there was no significant effect of the experimental manipulation on any of the six speech performance variables ($p > 0.28$). Therefore, self reported affective responses and behavioral indices were related in expected ways in the current study, but neither self-reported affect nor behavioral measures differed by experimental condition. These results suggest that participant behavioral and affective experiences were cohesive, yet were perhaps not directly affected by the emotion belief manipulation.

Discussion

The current study has important theoretical, social, and clinical implications for the advancement of an understanding of how individuals react and respond to stressful life experiences. The experience of stress in public speaking situations is very common, and this distress can still be both pronounced and impairing. For the current study, we were interested in examining how emotion malleability beliefs influenced state emotion regulatory behavior during a time-limited acute social stressor, rather

Table 4 Correlations between self-reported affect and behavioral outcomes during speech task

Scale	Correlations								
	1	2	3	4	5	6	7	8	9
<i>Affect variables</i>									
1. Negative affect during speech	–	–0.17	0.70*	0.02	–0.01	0.05	–0.17	0.12	–0.01
2. Positive affect during speech	–0.18	–	–0.60*	0.26*	0.03	–0.29*	0.43*	–0.50*	0.36*
3. Anxiety during speech	0.70*	–0.60*	–	–0.12	0.04	0.09	–0.24*	0.24*	–0.08
<i>Behavioral coding variables</i>									
4. Eye contact	0.02	0.26*	–0.12	–	–0.03	–0.11	0.56*	–0.54*	0.41*
5. Stuttered	–0.01	0.03	0.04	–0.03	–	0.12	–0.03	–0.01	–0.08
6. Had long pauses	0.05	–0.29*	0.10	–0.11	0.12	–	–0.34*	0.35*	–0.57*
7. Appeared confident	–0.17	0.45*	–0.24*	0.56*	–0.03	–0.34	–	–0.74*	0.63*
8. Appeared nervous	0.12	–0.50*	0.24*	–0.56*	–0.01	0.35*	–0.74	–	–0.60*
9. Generally spoke well	–0.12	0.36*	–0.08	0.41*	–0.08	–0.58*	0.64*	–0.61*	–

Negative and positive affect were measured using the modified state PANAS and anxiety was measured using the modified state version of the STAI

* $p < 0.05$

than a broader negative affective state. The present study clarifies a potential factor, namely emotion malleability beliefs, that influenced how individuals spontaneously responded to stress while engaged in a time-limited social evaluation situation. Specifically, individuals who were induced to see their emotions as more malleable were more likely to engage spontaneously in cognitive reappraisal to regulate their anxiety during the impromptu speech task.

John and Gross (2007) proposed that compared to more fixed emotion theorists, individuals who hold more malleable emotion theories would be more likely to use antecedent-focused emotion regulation strategies, such as cognitive reappraisal. The current study's findings substantiate John and Gross's and others' (e.g., Tamir et al. 2007) proposal regarding how emotion malleability beliefs could relate to regulatory behavior, specifically, and the current study's experimental design extends previous correlational work and establishes the causal role of emotion malleability beliefs on emotion regulatory behavior. Holding more malleable emotion theories has been tied to the greater trait use of reappraisal and it appears that this greater inclination to engage in reappraisal mediates the link between emotion malleability beliefs and psychological well-being (De Castella et al. 2013; Tamir et al. 2007). Therefore, the current study adds to this growing body of work, further substantiating the influence of emotion malleability beliefs on the use of reappraisal in response to emotional distress, and, more broadly, adds to our understanding of how people navigate their social and emotional worlds.

No significant group difference emerged for the spontaneous use of expressive suppression. This lack of difference as a function of the experimental manipulation could have been because expressive suppression represents an emotion regulation strategy that acts on the external expression of the emotion, rather than on our internal experience. Therefore, it could be that emotion malleability beliefs are more closely tied to strategies, such as cognitive reappraisal, that center on the regulation of our internal experience of the emotion rather than on emotion's outward expression. However, we found that individuals in the emotion is malleable condition did engage significantly more in regulatory strategies, such as cognitive suppression, that do act on internal experiences (e.g., thoughts). Therefore, exactly along what lines emotion malleability beliefs influence emotion regulation, such as through changing how the individual appraises the stressful situation, remains an empirical question that deserves further attention.

Understanding factors that influence the implementation of reappraisal is important because the use of reappraisal during an anxiety-eliciting speech task has been tied to multiple desirable outcomes such as decreased self-reported negative affect and emotional reactivity as well as the lack of significant negative impact on memory (Egloff et al. 2006; Richards and Gross 2000). Reappraisal's early temporal intervention is why this strategy is considered more effective in modulating an unwanted emotional response when compared to later stage strategies, such as expressive suppression, that act only one the emotion is fully felt (Richards and Gross 2000). However, it is

important to note that the current study, while clarifying that emotion malleability beliefs causally influence the use of cognitive reappraisal, did not find a significant link between the greater use of reappraisal and reductions in negative affect or anxiety. Additional work is needed in order to clarify if emotion malleability beliefs causally influence solely regulatory behavior, without significant effect on emotional experiences, or whether emotion regulatory behavior represents the link between emotion malleability beliefs and affective experiences.

Although there were no main effects of experimental group on changes in anxiety and negative and positive affect as a result of the speech, there were differential effects of the use of reappraisal to regulate emotions as a function of experimental manipulation. Specifically, in the fixed experimental condition, the use of cognitive reappraisal was associated with more of a decrease in positive affect, while this relationship was not significant for those in the malleable experimental group. This result could reflect the fact that individuals in the fixed experimental condition might not be able to reap the same benefits from more active emotion regulation strategies, such as reappraisal, compared to individuals who see their emotions as fixed. Alternatively, statistically, the greater variability in the use of cognitive reappraisal among individuals in the fixed emotion condition compared to the malleable emotion condition could facilitate the detection of the association between the use of reappraisal and changes in positive affect for participants in the fixed emotion condition. Understanding how individuals can maintain positive affect during a stressful public speaking situation is important because conceptualizations of social anxiety are increasingly expanding the focus on social anxiety to include positively valenced emotions (e.g., Kashdan 2007).

In terms of affect, we also found a general decrease in negative affect pre to post speech, rather than an expected increase in negative affect, possibly demonstrating that the speech task led to the desired increase in anxiety, specifically, rather than an overall negative affective state. In addition, this lack of significant increase in negative affect could reflect a methodological issue in the current study in that we asked participants' self-reported negative affect after the speech and after they completed the anxiety measure; therefore, we could be capturing a general sense of relief participants felt at the conclusion of the speech. In addition, the PANAS administered before the speech task cued participants to think of their affect "during the course of the past week" and therefore participants could have been experiencing elevated negative affect immediately before the speech task, yet the scale, based on how it was framed, did not capture the state negative affect as desired.

As expected, and in line with past research, the current study also found a significant gender difference in trait

levels of social anxiety, with women reporting higher levels of social anxiety compared to men (e.g., Moscovitch et al. 2005). By contrast, there was not a significant gender difference in emotion malleability beliefs, which is also in line with past research on trait level emotion malleability beliefs in which men and women report comparable beliefs about emotion's malleability (e.g., Tamir et al. 2007). Men and women report comparable beliefs about emotion malleability, and therefore it appears that potential gender differences in emotion malleability beliefs are not an explanation for the gender difference in trait levels of social anxiety found in the current study. Future work should continue to examine what demographic or personality variables, such as age or past depressive episodes, could shift the beliefs that individuals hold about emotion malleability.

The current study fits into the complex theoretical picture of what factors shape individuals' emotion regulation. Specifically, the current study provides support that emotion malleability beliefs can causally influence the use of certain emotion regulation strategies, specifically cognitive reappraisal, yet based on the current study's results, it remains unclear how these beliefs could relate causally to emotional experiences. It could be the case that emotion malleability beliefs causally influence the degree of engagement in emotion regulation, yet are not sufficient for "successful" emotion regulation, specifically in reducing or amplifying affect in line with the individual's goals. We acknowledge, though, that we tested these effects in a specific context—public speaking—in which emotion regulation efforts have been found in previous research (e.g., Kross et al. 2014) to have only limited influence in the moment. Future research might thus explore the effect of emotion malleability beliefs of the effectiveness of different emotion regulation strategies in other contexts in which such strategies are more influential.

Recent empirical work has focused on the variety of factors that can influence or impede successful emotion regulation. A recent review by Sheppes and colleagues outlined how emotion regulatory behavior could go awry in psychopathology (Sheppes et al. 2015) and proposed dimensions along which variations in regulatory behavior could relate to specific psychopathology. They proposed that individual differences in the selection of the appropriate strategy or the ability to switch to a different, alternate strategy should the initial regulatory strategy not be effective are dimensions along which emotion regulation could not be maximized. We propose that emotion malleability beliefs could influence which strategies individuals identify and select to use, but perhaps are less directly related to successful implementation of these strategies, and this lack of direct relationship is why the current study did not find group differences in the

relationship between emotion malleability beliefs and emotion regulation success (Sheppes et al. 2015). Specifically, perhaps individuals in the current study were selecting and identifying cognitive reappraisal as a more helpful strategy to use compared to those participants in the fixed condition, but these differences in beliefs about emotion did not enhance reappraisal's implementation. In addition, there is related evidence in the domain of social stress tasks, specifically, that indicates that the enactment of emotion regulatory strategies during the type of task used in the current study might not necessarily translate into successful downregulation of negative affect. Specifically, despite engaging in these regulatory efforts, individuals often still feel increased levels of negative affect and anxiety when completing an impromptu speech task (Kross et al. 2014).

Past work on malleability beliefs in other domains, such as intelligence found this strong malleability belief–effort expended relationship (Blackwell et al. 2007). Specifically, it has been proposed that it is through enhanced effort that students with malleable intelligence theories have greater resilience and better academic outcomes (Blackwell et al. 2007). Therefore, emotion malleability beliefs could enter into the domain of emotion regulation as a factor that influences motivation or willingness to engage in specific efforts at emotion regulation and in order for beneficial emotion regulation to occur, these beliefs must be held in conjunction with other skills, such as the ability to actually engage in cognitive reappraisal. Future work is needed to clarify further how these beliefs could interact with other cognitive factors or with specific regulatory skills or capacities to influence emotion reactivity and emotion regulation.

We note that the current study did not find significant associations with reappraisal with decreased anxiety and negative affect which, at first glance, appears to be in contradiction with past literature on reappraisal (e.g., Kappes and Schikowski 2013). However, the effectiveness of reappraisal for reducing negative affect varies across contexts (see Aldao 2013). Jamieson et al. (2012) studied the effect of reappraisal during and after a speech and found that reappraisal was effective in reducing cardiovascular arousal during the speech and promoted a faster recovery to physiological baseline following the speech task. Thus, future research might consider more fully the effects of reappraisal at different stages (anticipation of, experience during, and response following) different types of stressors (e.g., specific and concrete vs. more diffuse) on both self-report and physiological measures.

Relatedly, in terms of the validity of self-reported emotion states, there exists variability in the extent to which self-reported emotions represent a valid measure of true emotional experience; however, self-reports of

emotional experience that occur close in time to the actual emotion (as in the current study) are considered the most valid (Robinson and Clore 2002). Given the uncertainty in validly capturing emotional experience, and the high demand on insight and the ability to engage in interoception that is needed for self-reports of emotion, it is possible that the influence of emotion malleability beliefs does in fact impact state affect, yet is best captured through using a multi-modal approach. Past work examining differences in spontaneous emotion regulation behavior has tied certain strategies such as reappraisal and suppression to differences in physiological reactivity during negative emotion inductions and social stress tasks (e.g., Ehring et al. 2010; Hofmann et al. 2009). Taking a more multi-method approach could help clarify the seemingly contradictory results from the current study, especially if the greater use of cognitive reappraisal amongst individuals who were induced to view their emotions as malleable is then tied to decreased physiological arousal during a social stress task. In addition, the nature of the mood induction in the current study could also have limited the relationship between self-reported affect and emotion regulation. It could be that the effects of emotion regulation efforts are seen more in the recovery period after an emotionally evocative event, rather than in the actual performance situation. In the current study, we only asked about affect during the speech itself and therefore future work could examine how emotion malleability beliefs relate to emotional reactivity and recovery directly or indirectly through relating to differential patterns of emotion regulation. Put another way, this is not to say that emotion malleability beliefs do not have causal consequence on affective experiences, but perhaps their relationship is best examined across time, in recovery, or in other, more personally relevant affective experiences.

Another possibility is that participants in the current study were aware of the goal of the experimental manipulation and therefore responded based on demand characteristics rather than on the emotion belief manipulation. However, as described above, participants were excluded from analyses if they reported accurate suspicions regarding the study's purpose during the funneled debriefing procedure. As described in the supplemental material, participants were directly asked a series of questions from broad questions, such as: "what do you think the experiment was trying to study?" to more direct questions such as "Was there any relationship between the reading passage and the speech task?" Of the 100 initial participants, only six participants reported accurate suspicions regarding the study's purpose. In addition, if participants were responding based on demand effects, then we would expect that participants in the malleable experimental condition to endorse greater engagement in cognitive reappraisal and expressive suppression-reflecting their desire to report

controlling their emotions after reading an informative passage about how emotions can be controlled. However, the current study found that participants in the malleable emotion condition reported greater engagement in reappraisal and not suppression.

Although the current study most directly speaks to efforts to regulate of social stress in healthy individuals, future work could examine the influence of emotion malleability beliefs could be extended into emotional experiences in the clinical domain. The current study examined social anxiety in a relatively healthy student and community sample; however, the sample's mean score on the social anxiety measure, the BFNE-S, was 23.6. Although participants were not pre-screened into the study based on their levels of social anxiety, a score of 25 on this scale indicates clinically significant social anxiety and therefore the current study sample appears to have had elevated levels of social anxiety (Carleton et al. 2006). In terms of social anxiety and reappraisal, the use of reappraisal has been tied to improved therapeutic outcomes for the treatment of social anxiety (Goldin et al. 2012, 2013). In a recent study, only greater engagement in reappraisal and perceived success of reappraisal, and not the decreased use of expressive suppression, predicted decreases in subsequent social anxiety as a function of therapy (Goldin et al. 2014). However, it is important to note that although individuals in the current study were experiencing elevated levels of trait social anxiety, they were not formally diagnosed with social anxiety disorder, and it appeared that there was no significant association between reappraisal and self-reported anxiety and negative affect in the current study. Therefore further research is needed to clarify the exact impact of emotion malleability beliefs in pathological social anxiety.

In conclusion, one of the key questions in affective and clinical science is why, when all individuals experience stressful life events, do some individuals experience a transient, negative emotion, while others endure the more chronic, severe, and debilitating experience of clinical depression or anxiety. This study, although providing an initial step in answering this question, provides a potential explanation for the existence of individual differences in emotion regulatory behavior, and potentially why some individuals “cross the line” from transient emotional upset to psychopathology.

Compliance with Ethical Standards

Conflict of Interest Elizabeth T. Kneeland, Susan Nolen-Hoeksema, John F. Dovidio and June Gruber declare that they have no conflict of interest.

Informed Consent All procedures followed were in accordance with the ethical standards of the responsible committee on human

experimentation (national and institutional). Informed consent was obtained from all individual subjects participating in the study.

Animal Rights No animal studies were carried out by the authors for this article.

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