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How to Handle Anxiety: The Effects of Reappraisal, Acceptance, and Suppression Strategies on Anxious Arousal

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Abstract

It has been suggested that reappraisal strategies are more effective than suppression strategies for regulating emotions. Recently, proponents of the acceptance-based behavior therapy movement have further emphasized the importance of acceptance-based emotion regulation techniques. In order to directly compare these different emotion regulation strategies, 202 volunteers were asked to give an impromptu speech in front of a video camera. Participants were randomly assigned to one of three groups. The Reappraisal group was instructed to regulate their anxious arousal by reappraising the situation; the Suppression group was asked to suppress their anxious behaviors; and the Acceptance group was instructed to accept their anxiety. As expected, the Suppression group showed a greater increase in heart rate from baseline than the Reappraisal and Acceptance groups. Moreover, the Suppression group reported more anxiety than the Reappraisal group. However, the Acceptance and Suppression groups did not differ in their subjective anxiety response. These results suggest that both reappraising and accepting anxiety is more effective for moderating the physiological arousal than suppressing anxiety. However, reappraising is more effective for moderating the subjective feeling of anxiety than attempts to suppress or accept it.

Keywords

Emotion regulation; cognitive behavioral therapy; acceptance and commitment therapy; CBT; ACT; anxiety

Humans are constantly engaged in emotion regulation processes in an attempt to influence emotional experience and expression. Maladaptive emotion regulation strategies are implicated in anxiety disorders (e.g. Campbell-Sills & Barlow, 2007; Mullin & Hinshaw, 2007), social difficulties (Eisenberg, Hofer, & Vaughan, 2007; Wranik, Barrett, & Salovey, 2007), and physical illnesses (Sapolsky, 2007).

Emotion regulation consists of processes that influence the occurrence, intensity, duration, and expression of emotions. Based on influential emotion theorists (e.g., Ekmann, 1972; Frijda, 1986; Lazarus, 1991, Scherer & Ellgring, 2007), Gross and colleagues (Gross, 1998, 2002; Gross & John, 2003; Gross & Levenson, 1997; Ochsner, Bunge, Gross, & Gabrieli, 2002; Ochsner & Gross, 2008) proposed a popular model of emotion regulation. This model emphasizes the appraisal of external or internal emotional cues that trigger a set of experiential,

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physiological, and behavioral response tendencies. Accordingly, emotions can be regulated by either manipulating the input to the system (antecedent-focused emotion regulation) or by manipulating the output of the regulation process (response-focused emotion regulation strategies). Antecedent-focused strategies include cognitive reappraisal techniques, such as situation selection or modification, attention deployment, and cognitive re-framing of the situation. Reappraisal techniques are frequently applied in cognitive behavioral therapy (CBT; e.g., Beck, 1979). A frequently studied response-focused strategy is to suppress emotional reactions (e.g., Gross, 1998).

Studies have consistently shown that suppression strategies have counterproductive effects because they typically lead to a paradoxical increase in the unwanted experience and physiological arousal (Cioffi & Holloway, 1993; Gross, 1998; Gross & Levenson, 1997; Wegner & Gold, 1995; Wegner & Zanakos, 1994). In contrast, antecedent-focused emotion regulation strategies are relatively successful in decreasing negative emotion and physiological arousal, in response to distressing emotional stimuli (Gross, 1998; Gross & Levenson, 1997). For example, cognitive reappraisal strategies reduce the stress response and increase tolerance for emotional stimuli, without any detrimental effects (Gross, 1998; Richards & Gross, 2000). It has been argued that CBT primarily (but not exclusively) promotes adaptive antecedent-focused emotion regulation strategies (Hofmann & Asmundson, 2008). Other important elements of CBT include exposure procedures and validity testing of maladaptive cognitions, and examining beliefs and schemata that give rise to maladaptive and automatic thoughts (e.g., Beck, 1979).

A less studied, but potentially therapeutic approach is acceptance of the emotional response. Acceptance-based strategies are promoted in more recent psychotherapy approaches, such as in Acceptance and Commitment Therapy (ACT; Hayes, Strohsahl, & Wilson, 1999). Aside from acceptance, ACT includes a number of other processes, including defusion, values, self as context, contact with the moment, values, and commitment.

So far, very few laboratory studies have been conducted examining the effects of acceptance-based emotion regulation strategies, and no study to date has directly compared reappraisal and acceptance-based strategies.Eifert and Heffner (2003) compared the effects of acceptance versus control strategies on the avoidance of panic-relevant interceptive stimulation, elicited by carbon dioxide enriched air. The authors reported that participants assigned to the acceptance condition reported less intense fear and fewer catastrophic thoughts as compared to participants in the control or non-instruction condition. Campbell-Sills, Barlow, Brown, and Hofmann (2006b) investigated perceived acceptability and suppression of negative emotion in participants with anxiety and mood disorders. Participants were instructed to either suppress or accept their emotional response to an emotion-provoking film. The results showed that participants in the acceptance condition showed less negative affect during the post-film recovery period, whereas participants in the suppression condition evidenced increased cardiac arousal and inhibited mood recovery.

Hayes et al. (2006) encouraged researchers to “conduct micro-studies on each of the key ACT processes (e.g., acceptance, defusion, values, self as context, contact with the moment, values, and commitment) to see if each is psychologically active and works in a fashion that accords with the theory” (Hayes, Luoma, Bond, Masuda, & Lillis, 2006; p. 14). The goal of this study was to conduct such a micro-study of one of those components, acceptance of emotions, and to compare it to reappraisal and suppression.

Suppression instructions have been frequently used in emotion research (e.g., Gross, 1998, 2002, Gross & Levenson, 1997; John & Gross, 2004; Ochsner et al., 2002; Richards & Gross, 2000), and face-valid reappraisal instructions are relatively easy to construct. Considerably

more difficult is the definition of the construct of acceptance. Hayes and colleagues (2006) define *acceptance* as "the active and aware embrace of (…) private events occasioned by one's history without unnecessary attempts to change their frequency or form, especially when doing so would cause psychological harm. For example, anxiety patients are taught to feel anxiety, as a feeling, fully and without defense" (Hayes et al., 2006; p. 14). Similarly, others define acceptance as "a willingness to have one's internal responses in order to participate in meaningful experiences [rather than] judgment and avoidance of internal experiences" (Roemer & Orsillo, 2007; p. 74) and as "a willingness to experience events fully and without defense" (Forsyth, Parker, & Finlay, 2003; p. 865). We translated these definitions into experimental instructions by asking participants to experience their feelings fully, without attempting to control or change them in any way, to let their feelings run their natural course, and to stay with their emotions, as fully as possible, without trying to control their feelings in any way.

The goal of the current study was to directly compare reappraisal, acceptance, and suppression strategies for regulating emotions. The cognitive model predicts that cognitive reappraisal is associated with the least physiological arousal, whereas the ACT model predicts that acceptance is associated with the least physiological arousal. Based on previous studies, we further predicted that suppression is associated with the most physiological arousal.

Method

Participants

Two hundred and two undergraduate students from introductory psychology classes at Boston University participated in individual experimental sessions. One of the participants had incomplete questionnaire data and nine had incomplete psychophysiological data due to equipment failure. Therefore, questionnaire data were available for 201 participants and heart rate data were available for 193 participants. This sample size provided the main analysis with sufficient statistical test power (.90) to detect a small group difference (effect size: 0.15) at $p < .05$.

The majority of participants were Caucasian (53.5%). Other individuals identified themselves as Asian (21.8%), Asian-Indian (6.9%), Latino (6.4%), African-American (5.0%), and Other (5.5%). Most participants were women (58.9%). The mean age of the sample was 19.6 years (range = 19–48; *SD* = 2.88). Most participants were single without a partner (66.3%) or single with a partner (27.7%).

Procedure

Upon arrival at the laboratory, written consent was obtained that was approved by the Institutional Review Board of the university. The entire procedure took approximately 1.5 hours, and participants received course credit for the study. The consent form mentioned that the purpose of the study was to investigate how the handling of emotions affects bodily reactions during a stressful social task. Participants were informed that they would be asked to give an impromptu speech in front of a video camera near the end of the experiment. After signing the consent form, participants were asked to fill out a number of self-report instruments. After filling out the questionnaires, participants were escorted to a sound attenuated laboratory. The participants were left alone in the room and communicated with the experimenter via an intercom. Participants were asked to sit as still as possible throughout the experimental session.

The experiment began with a 3-minute baseline period. Participants were given the following instructions: *"Before we begin, please just sit quietly with your eyes closed for 3 minutes. I will tell you when the 3 minutes are over."* Following the baseline period, the video camera

was turned on and participants were told that they would be asked to give an impromptu 10-minute speech in front of a video camera about three controversial topics that would be handed to them after a brief anticipation period. A similar experimental procedure for inducing anxious arousal has been used in previous studies (Davidson, Marshall, Tomarken, & Hendriques, 2000; Hofmann, 2007a; Hofmann, Moscovitch, & Kim, 2006; Hofmann, Moscovitch, Litz, Kim, Davis, & Pizzagalli, 2005). The speech duration and termination before the 10 minutes elapsed served as behavioral indicators of social anxiety.

To measure the effects of different emotion regulation strategies on anxious arousal, participants were randomly assigned to one of three groups by receiving one of three instructions orally and in written form. The instructions for the appraisal and suppression strategies very closely followed the procedure that Gross and colleagues used in previous studies (Gross, 1998, 2002, Gross & Levenson, 1997; John & Gross, 2004; Ochsner et al., 2002; Richards & Gross, 2000). The acceptance instructions were an abbreviation of the procedure used by Campbell-Sills and colleagues (Campbell-Sills et al., 2006a,b). These instructions were derived directly from strategies described by Hayes et al. (1999). More specifically, the instructions were as follows:

> Reappraisal group (n = 68): *In a few minutes, you will be asked to give an impromptu 10 minute speech in front of a video camera about some controversial topics. It is quite normal that an impromptu speech creates some level of discomfort or even fear. Please try to take a realistic perspective on this task, by recognizing that there is no reason to feel anxious. Nevertheless, please realize that the situation does not present a threat to you. Regardless of what occurs during this task or how anxious you appear, it is just an experiment, and there are no negative consequences to be concerned with. You will receive a list of speech topics in a few minutes. For now, please sit quietly with your eyes closed for one minute. During this time, please handle your feelings in the manner I suggested. I will inform you when the one minute has expired.*
>
> Suppression group (n = 67): *In a few minutes, you will be asked to give an impromptu 10 minute speech in front of a video camera regarding some controversial topics. It is quite normal that an impromptu speech creates some level of discomfort or even fear. Please try not to let your feelings show as you give your speech. Nevertheless, please behave in such a way, that a person watching you would not know you were feeling anything. You will receive a list of speech topics in a few minutes. For now, please sit quietly with your eyes closed for one minute. During this time, please handle your feelings in the manner I suggested. I will inform you when the one minute has expired.*
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> Acceptance group (n = 67): *In a few minutes, you will be asked to give an impromptu 10 minute speech in front of a video camera regarding some controversial topics. It is quite normal that an impromptu speech creates some level of discomfort or even fear. Please try to experience your feelings fully and do not try to control or change them in any way. Nevertheless, please let your feelings run their natural course and allow yourself to stay with your emotions, as fully as possible, without trying to control your feelings in any way. You will receive a list of speech topics in a few minutes. For now, please sit quietly with your eyes closed for one minute. During this time please handle your feelings in the manner I suggested. I will inform you when the one minute has expired.*

After the anticipation period, participants received the written and oral instructions to give a 10-minute speech. As part of these instructions, they received a sheet of paper with three speech topics (the mandatory seat belt law, the war in Iraq, and the death penalty). Participants were told that they could talk about all three or only one or two of these topics, that there were no restrictions in what they could say about these topics, and that it did not matter how much time

they spent on each topic or which topic they completed first. They were asked to speak for the entire 10-minute duration, but they were told that they could end the speech prematurely for whatever reason by raising their hand. In order to maximize their level of anxiety, participants were told that members from the research staff might later evaluate the quality of their speech. However, in actuality the recordings of the speeches were not collected or evaluated. After the speech was completed, the experimenter entered the room and turned off the video camera. Following the speech, participants were instructed to sit quietly with their eyes closed. This recovery period lasted for three minutes.

Heart Rate Recording

The plus and minus channels of the grounded electrocardiogram were recorded through electrodes attached to both sides of each participant's lowest ribs. Target skin areas were cleaned with alcohol wipes and allowed to dry. R-waves were automatically detected by the computer program and raw ECG and R-wave identification marks were simultaneously viewed graphically by the experimenter. The R-wave file was manually corrected to remove R-wave identification marks that were incorrectly specified (e.g., a movement artifact that the computer coded as an R-wave) or to score R-waves that were missed by the automated detection. Heart rate was computed as the number of R-waves per minute.

Heart rate was recorded with equipment made by James Long Company, Caroga Lake, NY and with the data-acquisition program Snap-master for Windows. The system allows for continuous collection of recordings. The raw data were digitized at 512 samples per second, with a 31-channel A–D converter operating at a resolution of 12 bits and having an input range of −2.5 V to + 2.5 V. The psychophysiological channel was amplified by individual SA Instrumentation bio-amplifiers. The amplification rates and high-pass filter and low-pass filter settings were as follows: electrocardiogram (gain = 500, high-pass filter = 0.1 Hz, low-pass filter = 1000 Hz) and skin conductance level (gain = 0.1 V/microsiemens, high-pass filter = none/DC, low-pass filter = 10 Hz). During the collection of data, laboratory software computed average values. The experimental periods were marked manually by the experimenter using an event marker.

Self-Report Measures

In order to measure subjective anxiety, participants were administered the short form of the state version of the State-Trait-Anxiety-Inventory (STAI, Spielberger, Gorsuch, & Lushene, 1970) immediately following each of the experimental phases (baseline, anticipation, speech, and recovery). The instructions of the STAI asked participants to indicate how they "feel right now, at this moment." The instrument shows excellent psychometric properties (Marteau & Bekker, 1992).

In addition, participants were asked to complete the Positive and Negative Affect Schedule (PANAS, trait form; Watson, Clark, & Tellegen, 1988) and the Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998) at baseline. The PANAS consists of two subscales measuring positive affect (PA) and negative affect (NA) and is a widely used instrument with good reliability and validity (Mackinnon et al., 1999; Watson et al., 1988). The SIAS is a measure of general level of social anxiety with good psychometric properties (Heimberg, Mueller, Holt, Hope, & Liebowitz, 1992).

Results

Randomization

Participants were randomly assigned to one of the three groups (Reappraisal, Acceptance, and Suppression). The three groups were comparable in the positive affect, F (2, 191) = 2.04, p > .

13, and the negative affect, F (2, 191) = .48, $p > .6$, subscales of the PANAS, and the SIAS, F (2, 193) = .30, $p > .7$. However, the three groups showed a small, but statistically significant difference in the STAI scores at baseline, F (2, 193) = 3.06, $p = .049$, partial $\eta^2 = 0.03$. Pairwise post-hoc group comparisons (Least Square Difference) showed that the Acceptance group had slightly higher STAI scores at baseline than the Reappraisal group (mean difference: −1.39, *S*E = .65, $p = .034$) and the Suppression group (mean difference: −1.42, *SE* = .66, $p = .032$). The Reappraisal and Suppression groups did not differ from one another in the STAI scores at baseline ($p > .97$). Furthermore, no difference was observed in the mean heart rate of the three groups at baseline, F (2, 193) = 2.13, $p = .12$, partial $\eta^2 = 0.02$. In order to control for the differences at baseline, we calculated individual change scores from baseline for heart rate and the STAI and included those difference scores as the dependent variable in all subsequent analyses. Table 1 depicts the means (standard deviations) of heart rate and STAI scores at the baseline, anticipation, speech, and recovery phases for the three experimental conditions (Reappraisal, Suppression, and Acceptance).

Effect of Emotion Regulation on Psychophysiological Arousal

In order to examine whether the three emotion regulation strategies affected psychophysiological responses during the anticipation, speech, and recovery phases, we conducted a 3 (Group: Reappraisal, Acceptance, and Suppression) by 3 (Time: Anticipation, Speech, and Recovery) repeated measure MANOVA with the STAI and heart rate change scores from baseline as the dependent variable. Complete data were available from 64 participants in the Reappraisal group, 64 participants in the Suppression group, and 65 participants in the Acceptance group.

The results showed a significant Group effect, F (4, 378) = 3.34 (Wilks' Lambda), $p = .011$, partial $\eta^2 = 0.034$, and a significant Time effect, F (4, 187) = 158.89, $p < .0001$, partial $\eta^2 = 0.77$. The Time by Group interaction effect was not significant, $F < 1$, $p > .4$. Univariate analyses showed a significant Group effect for heart rate, F (2, 190) = 3.46, $p = .033$, partial $\eta^2 = 0.04$, and STAI, F (2, 190) = 3.56, $p = .03$, partial $\eta^2 = 0.04$. Figures 1 and 2 show the changes from baseline in heart rate and STAI, respectively.

Pairwise post-hoc group comparisons (Least Square Difference) in the changes in heart rate from baseline revealed that the Suppression group had a significantly greater increase in heart rate than the Reappraisal group (mean difference: −1.57, *SE* = .73, $p = .03$) and the Acceptance group (mean difference: −1.75, *SE* = .73, $p = .02$). The Acceptance and Reappraisal groups did not differ from one another in heart rate changes from baseline ($p > .81$).

Pairwise post-hoc group comparison (Least Square Difference) in the STAI changes from baseline showed that the Suppression group reported more anxiety than the Reappraisal group (mean difference: −1.77, *SE* = .67, $p = .008$). No significant differences were observed in STAI changes between the Acceptance and Suppression groups (mean difference: .90, *SE* = .66, $p = .18$), or between the Acceptance and Reappraisal groups (mean difference: .88, *SE* = .66, $p = .19$).

Effect on Speech Length and Speech Termination

In order to examine the effect of the emotion regulation strategies on behavioral anxiety indicators, we examined the group differences in the length of the speech and also the frequency of participants who prematurely terminated the speech (i.e., before the 10 minutes elapsed). For this purpose, we conducted a 3-way ANOVA with group (Reappraisal, Acceptance, and Suppression) as the single between-subject factor and the length of the speech as the dependent variable. The three groups did not differ in the length of speeches, F (2, 199) = 1.88, $p > .15$. Approximately half of the participants in all three groups (48.52% of the Reappraisal group,

47.76% of the Suppression group, and 58.20% of the Acceptance group) terminated the speech before the 10 minutes elapsed, $\chi 2$ (2) = 1.82, $p > .4$.

Discussion

The goal of the study was to directly compare reappraisal, acceptance, and suppression strategies for regulating anxiety. Previous research consistently suggests that suppression is the least successful strategy because it is associated with heightened subjective anxiety and physiological arousal (e.g. Gross, 1998; Campbell-Sills & Barlow, 2007). In contrast, the cognitive therapy model and contemporary cognitive approaches to emotion regulation predict that cognitive reappraisal is the most successful strategy (Gross, 1998, Gross & Levenson, 1997; Gross & John, 2003; Ochsner et al., 2002; Ochsner & Gross, 2008), whereas acceptance-based behavior therapy approaches, such as Acceptance and Commitment Therapy, predict that acceptance is the most successful technique (e.g. Hayes et al., 1999; Roemer & Orsillo, 2002).

In order to test these predictions, we recruited a large sample of undergraduate volunteers and instructed them to reappraise, suppress, or accept their anxiety before and during an impromptu speech task. The sample size of 193 for the main analyses provided the main statistical test with sufficient power (.90) to detect an even small effect (effect size: 0.15) at $p < .05$. Our study is the first to directly compare reappraisal, acceptance, and suppression strategies for regulating anxiety.

As expected, the Suppression group showed a greater increase in heart rate from baseline than the Reappraisal and Acceptance groups. Moreover, the Suppression group reported more anxiety than the Reappraisal group. However, the difference between the Acceptance group and the Suppression group in their subjective anxiety response did not reach statistical significance, despite the sufficiently high test power. These results suggest that both reappraisal and acceptance strategies are more effective than suppression for moderating the physiological arousal during an anxiety-provoking situation. However, the reappraisal strategy was more effective for moderating subjective feelings of anxiety than attempts to suppress or accept the emotional experience. The group comparisons in the SIAS and PANAS suggest that these effects are unlikely due to differences in trait levels of social anxiety or general affect.

These results support earlier research suggesting that suppressing emotions leads to a paradoxical increase in the unwanted emotional experience, whereas reappraisal is an effective method to moderate subjective and physiological arousal (Campbell-Sills et al., 2006a,b; Gross, 1998; Gross & Levenson, 1997). The acceptance strategy was as effective as the reappraisal strategy for regulating physiological arousal, but not more effective than the suppression strategy for reducing the subjective level of anxiety. Thus, overall, reappraisal was the most effective strategy for regulating anxious arousal in the present study. It should be noted, however, that the absolute differences between the groups were not very large. Due to the large sample size, not much change was needed to obtain statistically significant findings. It is possible that the differences might have been more pronounced if we had induced greater anticipatory anxiety by making the speech task more challenging.

Based on Gross' model of emotional processing (Gross, 1998), reappraisal may be considered an antecedent-focused strategy, whereas suppression and possibly acceptance (Hofmann & Asmundson, 2008) may be seen as response-focused strategies. It should be noted, however, that acceptance could also be regarded as an antecedent-focused strategy in the sense that it changes the interpretation of the emotion-eliciting stimulus and its meaning. It has been suggested that antecedent-focused strategies are more effective and less effortful than response-focused strategies because the emotional response can be regulated before it has risen to an

overwhelming peak (John & Gross, 2004). In contrast, response-focused emotion regulation strategies come relatively late in the emotion-generative process and require the person to effortfully manage response tendencies.

Although the present study expands the emerging research on emotion regulation, the study is by no means a fair test of acceptance-based treatment strategies, cognitive reappraisal techniques, or of Acceptance and Commitment Therapy or Cognitive-Behavioral Therapy. As noted earlier, acceptance is only one of six processes in ACT, and reappraisal is only one of the many treatment components of CBT. In line with Hayes et al.'s (2006) recommendation to conduct isolated micro-studies, we examined isolated components of these treatment approaches. Therefore, it should be kept in mind that any experimental studies of therapy models are necessarily simplifications of highly complex interpersonal processes.

Similarly, the experimental manipulations employed in this study to compare the different emotion regulation strategies are only rough approximations of the targeted emotion regulation processes. Particularly challenging was the acceptance instructions. In contrast to previous studies (Campbell-Sills et al., 2006a,b), the acceptance instructions were relatively brief, without the use of any metaphors and imagery. For the purpose of this study, we gave participants relatively brief instructions that were similar in length to the more frequently used reappraisal and suppression instructions (Gross, 1998). The acceptance instructions very closely followed the definition of acceptance found in the contemporary ACT literature (Forsyth et al., 2003; Hayes et al., 2006; Roemer & Orsillo, 2007). Interestingly, our acceptance instructions resemble control conditions in some studies in the affective neuroscience literature (Kim & Hamann, 2007; Ochsner, Bunge, Gross, & Gabrieli, 2002; Phan et al., 2005). For example, Phan et al. (2005) instructed participants in a condition they referred to as the *maintain* control condition "to attend, be aware of, and experience naturally (without trying to change or alter) the emotional state elicited by the pictures" (p. 211). This issue is related to another limitation of the study, namely the lack of a control condition. One possibility would have been to add a condition without any specific instructions on how participants should deal with their emotions. However, one could argue that whenever participants are exposed to emotional stimuli, they will employ strategies to regulate their emotions. Therefore, a no-instruction control condition would have encouraged participants to employ their own habitual emotion regulation strategies, questioning the usefulness of such a control condition.

Another weakness was the lack of a manipulation check. We used similar instructions as Gross and colleagues to induce suppression (e.g., Gross & Levenson, 1997), and we replicated their earlier findings, suggesting that our experimental manipulation worked (Gross, 1998, 2002; Gross & Levenson, 1997). It should be noted, however, that the reappraisal instructions in the present study differed from what was used by Gross (1998), who instructed participants to "try to adopt a detached and unemotional attitude as you watch the film. In other words, as you watch the film clip, try to think about what you are seeing objectively, in terms of the technical aspects of the events you observe. Watch the film clip carefully, but please try to think about what you are seeing in such a way that you don't feel anything at all" (p. 227). In contrast, the instructions of the current study encouraged participants to take a realistic perspective toward the situation ("Please try to take a realistic perspective on this task, by recognizing that there is no reason to feel anxious."). Although these instructions are consistent with contemporary cognitive approaches to social anxiety (e.g., Clark & Wells, 1995; Rapee & Heimberg, 1997; Hofmann, 2007b), they differed from Gross' instructions in that his instructions were more indirect and open, and our instructions were more direct. As a result of the deviation from Gross' reappraisal instructions, the speech task might have been less threatening to participants in the reappraisal condition than in the suppression condition. Finally, we did not account for any individual differences in the participants' natural tendencies to use specific emotion

regulation strategies. However, it is unlikely that our results are systematically biased given the random assignment of a relatively large group of individuals.

Despite these limitations, the results suggest that both reappraising and accepting anxiety is more effective for moderating the physiological arousal than suppressing anxiety, but reappraising appears to be more effective for moderating the subjective feeling of anxiety than attempts to suppress or accept it. It should be noted, however, that this study only examined the short-term effects of these emotion regulation strategies in a nonclinical sample. A direct link to contemporary treatment approaches (ACT vs. CBT) in clinical populations is difficult to make because these interventions are more concerned with long-term effects of adaptive emotion regulation strategies. For example, it may be possible that a strategy that leads to increased physiological and emotional responding to stressors in the short-term may be more beneficial for adaptive emotional processing and more effective in the long-term (e.g., Foa & Kozak, 1986). Moreover, it is possible that it is the flexible use of different emotion regulation strategies, rather than the specific type of strategy per se, that is most adaptive (Bonnanno, Papa, Lalande, Westphal, & Coifman, 2004).

Future studies are needed to elucidate the effects of different emotion regulation strategies in clinical groups and to examine individual differences in habitual tendencies to regulate emotions. These studies could enhance the relevance by observing clinical participants and their responses to stimuli that relate directly to their particular disorder. Moreover, outcome-oriented and process-oriented studies of therapies that examine the effects of different emotion regulation strategies are a particularly promising new direction in research as they combine the insights of modern emotion theorists and applied clinical researchers.

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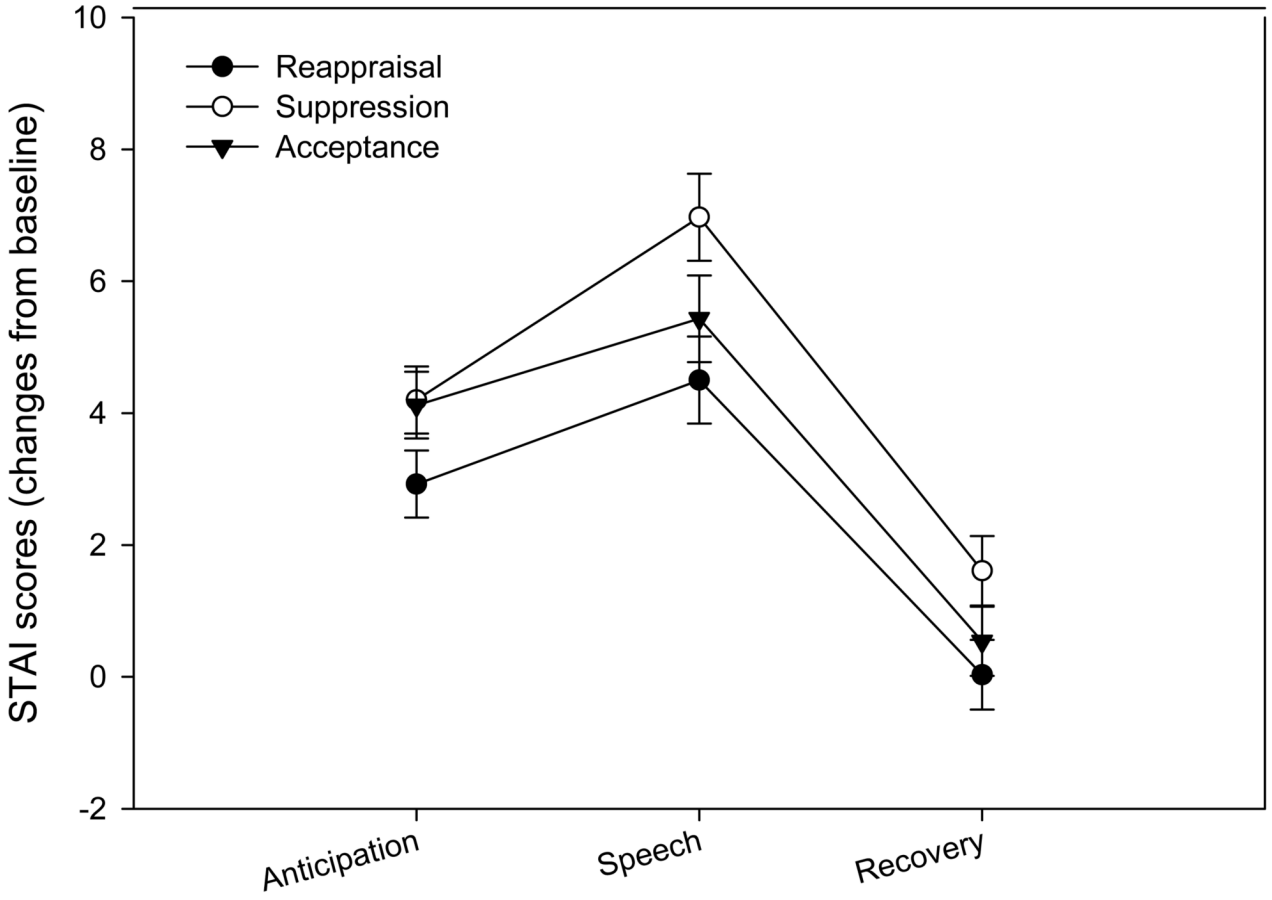

Figure 1.
Changes from baseline in the State-Trait Anxiety Inventory, short form, after the anticipation, speech, and recovery phases for participants who were instructed to reappraise, suppress, or accept their anxiety. The graph depicts means and standard errors.

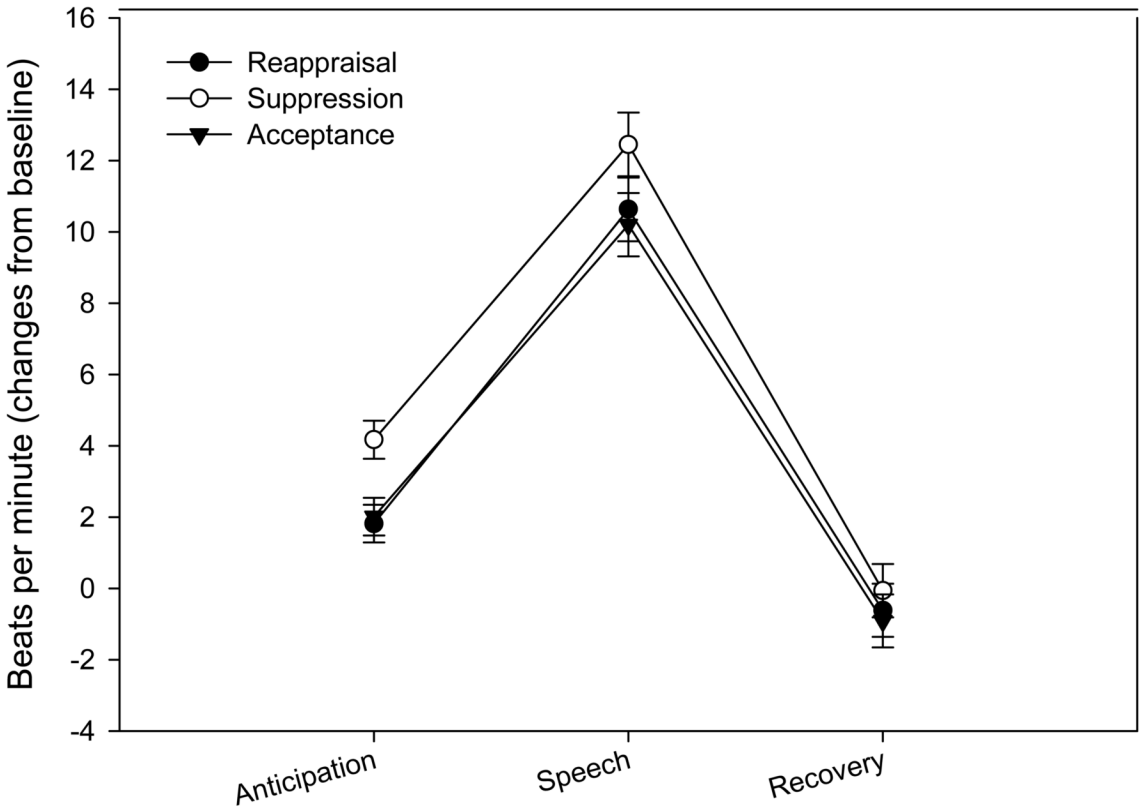

Figure 2.
Changes from baseline in mean heart rate during the anticipation, speech, and recovery phases for participants who were instructed to reappraise, suppress, or accept their anxiety. The graph depicts means and standard errors.

Table 1

Mean heart rate values and STAI scores.

		Baseline	Anticipation	Speech	Recovery
Heart Rate	Reappraisal	73.80 (12.40)	75.62 (12.41)	84.44 (13.35)	73.19 (13.19)
	Suppression	77.34 (14.46)	81.51 (15.26)	89.79 (16.06)	77.27 (16.19)
	Acceptance	78.40 (11.71)	80.41 (12.08)	88.60 (11.69)	77.48 (11.83)
STAI	Reappraisal	12.44 (3.41)	15.36 (4.53)	16.94 (5.03)	12.47 (3.79)
	Suppression	12..48 (3.42)	16.69 (4.84)	19.45 (6.05)	14.09 (4.30)
	Acceptance	13.86 (4.35)	17.98 (4.88)	19.29 (5.00)	14.40 (4.39)

Note: The table shows mean heart rate values (beats per minute) and STAI scores at baseline, the anticipation phase, the speech phase, and the recovery phase for participants who were asked to reappraise (Reappraisal), suppress (Suppression), or accept (Acceptance) their anxiety.