Reducing Test Anxiety and Improving Test Performance by Increasing Perceived Attainability in Emotion Regulation:

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Tony Gutentag ▎ Tzur Karelitz ▎ Maya Tamir

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Reducing Test Anxiety and Improving Test Performance by Increasing Perceived Attainability in Emotion Regulation:

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Tony Gutentag

Maya Tamir

The Hebrew University of Jerusalem

Tzur Karelitz

The National Institute for Testing and Evaluation

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Introduction

Test anxiety can impair test performance (Hembree, 1988). However, anxiety can be controlled by emotion regulation – the process by which people influence their emotional experiences (Gross, 1998a). The efficacy of emotion regulation depends on whether people try to regulate their emotions, and on the manner in which they do so. To date, research on emotion regulation and test anxiety has focused exclusively on how people try to regulate their anxiety (Ergene, 2003). We propose that it is also important to focus on factors determining whether people try to regulate their anxiety, such as their belief that changing anxiety is attainable. We hypothesized that leading people to believe that reducing test anxiety is possible would propel them to try to reduce their test anxiety, ultimately experiencing less test anxiety and performing better on the test.

We ran two studies to test these hypotheses. In Study 1, we tested whether test anxiety and test performance are linked to the attainability of reducing test anxiety, as measured before and during a stressful exam period. In Study 2, we tested whether perceived attainability contributes to test anxiety and influences test performance. We also tested whether the potential effect of perceived attainability of reducing test anxiety is moderated by the use of an effective regulation strategy (i.e., cognitive reappraisal; Gross, 1998b).

Study 1

Study 1 tested whether the perceived attainability of reducing test anxiety is linked to self-reported test anxiety and test performance, before and during an exam period. We measured attainability of reducing test anxiety using two measures: A single explicit self-report item (i.e., "Is reducing my test anxiety attainable?"), and a validated self-efficacy scale adapted to reducing test anxiety (i.e., "Can I control my test anxiety?"). These were measured before and during an exam period. Test anxiety was measured at the trait level before and during the exam period, and at the state level during the exam period. Finally, participants reported their mean grades to date, and their subjective satisfaction with these grades. We hypothesized that people who believed that reducing test anxiety was attainable, would report lower test anxiety and better test performance.

Method

Participants

Before the exam period, 154 students completed the first part of the survey; and 81.2% of them (N = 125) completed the second part of the survey during the exam period (M_{age} = 24.20, SD = 2.59; 69.6% women). All students were eligible to participate, irrespective of their baseline level of test anxiety. Participants who completed the second assessment did not differ significantly from those who did not in terms of demographics, attainability of reducing test anxiety, and self-efficacy in reducing test anxiety (ts < 1.7). However, participants who completed the second assessment had lower trait test anxiety (M = 2.28, SD = 0.80) compared to those who did not (M = 2.61, SD = 0.65), $t(152)$ = 2.11, p = .036, d = 0.45. This may be because students higher in trait test anxiety were too anxious to participate in our study during the exam period. This investigation, therefore, oversampled students experiencing low and moderate test anxiety.

Procedure

Two and a half months to one-month before the exam period participants completed questionnaires in the following order: perceived attainability of reducing test anxiety, trait test anxiety, and self-efficacy in reducing test anxiety. During the exam period, participants completed questionnaires in the following order: trait test anxiety, state test anxiety, perceived attainability of reducing test anxiety, and self-efficacy in reducing test anxiety. Finally, participants provided demographic information, and reported their grades thus far in the current exam period and their satisfaction with these grades.[1]

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[1] We collected additional measures that were less relevant to the target hypotheses, and so we do not refer to them here. We would be happy to do so upon request.

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Trait test anxiety. Participants completed the 5-item short form of the Test Anxiety Inventory (TAI; Spielberger, 1980; Taylor & Deane, 2002; "During tests I feel very tense"; $\alpha_{t1} = .86$, $\alpha_{t2} = .86$) on a 4-point scale (*1 – almost never; 4 – almost always*).

State test anxiety. We adapted the trait test anxiety scale to a state measure during exam period ("The upcoming test is making me very tense"; $\alpha_{t2} = .87$).

Perceived attainability of reducing test anxiety. P articipants rated the following item: "If you wanted to, to what extent would you be able to reduce your test anxiety during the exam period?" on a 7-point scale (*1 – not at all; 7 – very much*).

Self-efficacy in reducing test anxiety. Participants completed the 4-item Implicit Theories of Emotion scale (Tamir, John, Srivastava, & Gross, 2007) adapted to the target emotion of reducing test anxiety, in a first-person format (De castella et al., 2013; e.g., "I can learn to control my test anxiety"; $\alpha_{t1} = .85$, $\alpha_{t2} = .83$). Responses were made on a 5-point scale (*1 – strongly disagree; 5 – strongly agree*).

Test performance. Participants were asked to report their mean grade thus far in the current exam period.

Satisfaction with test performance. Participants were asked to report to what extent they are satisfied with their grades thus far in the current exam period, on a 7-point scale (*1 – not at all; 7 – very much*).

Results.

Means, standard deviations and correlations are presented in Table 1.

Table 1

Means, Standard Deviation and Pearson Correlations among Key Variables (N=125; Study 1)

		Mean	SD	1	2	3	4	5	6	7	8
1	T1 – Trait test anxiety	2.28	0.80	1							
2	T1 – Attainability of reducing test anxiety	4.40	1.56	-.18*	1						
3	T1 - Self-efficacy in reducing test anxiety	4.48	0.86	-.24*	.17	1					
4	T2 – Trait test anxiety	2.16	0.75	.79**	-.14	-.29*	1				
5	T2 – State test anxiety	2.01	0.77	.70**	-.17	-.27*	.89**	1			
6	T2 – Attainability of reducing test anxiety	4.06	1.60	-.11	.47**	.34*	-.25*	-.21*	1		
7	T2 – Self-efficacy in reducing test anxiety	4.46	0.93	-.35**	.29**	.41*	-.48**	-.49**	.67**	1	
8	Test performance	88.32	5.68	-.16	-.11	-.09	-.16	-.16	.06	.03	1
9	Test performance satisfaction	4.37	1.81	-.25*	-.11	.08	-.25*	-.24*	.18*	.16	.40**

Note. T1 = before exam period; T2 = during exam period.

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As shown in Table 1, participants reported moderate trait test anxiety, which was stable over time. Trait test anxiety decreased during the exam period, $t(124) = 2.66$, $p = .009$, $d = 0.15$, possibly due to attrition of students experiencing higher test anxiety (see Participants section).

As predicted, state and trait test anxiety were negatively linked to perceived attainability of reducing test anxiety within each time point, so that people who believed that reducing their test anxiety was more attainable reported lower test anxiety. State and trait test anxiety were linked to self-efficacy in reducing test anxiety within and between time points, so that people who believed they were better able to reduce their test anxiety reported lower test anxiety.

With respect to test performance, contrary to our predictions, test performance was unrelated to any of the other measures. However, as predicted, test performance satisfaction was linked to the perceived attainability of reducing test anxiety during the exam period, such that people who believed that reducing their test anxiety was more attainable reported higher test performance satisfaction. In addition, test performance satisfaction was also linked to trait test anxiety before and during exam period, such that people who were less test anxious were more satisfied with their test performance.

Discussion

As predicted, perceived attainability of reducing test anxiety was inversely related to test anxiety. Higher perceived attainability of reducing test anxiety and lower test anxiety were linked to higher test performance satisfaction. The lack of significant associations between test performance and beliefs about attainability suggests that beliefs might influence test anxiety rather than performance directly. This is plausible, given that there are many other factors that likely drive test performance, including ability, attention, etc. In addition, it is possible that when asked to report their mean grades, rather than reporting the mean of their grades in the current exam period, students reported their overall grade point average, which is likely more accessible. A general grade point average reflects performance on former tests, which may be less relevant to their current experience of test anxiety.

Study 1 has several limitations. First, participants' attrition was not random, and so we do not know whether the associations that were found generalize to students experiencing higher levels of test anxiety. Second, the correlational design does not allow us to infer causality. Therefore, it is possible that believing that reducing test anxiety is more attainable leads people to have lower levels of test anxiety, but it is equally plausible that people with lower levels of test anxiety believe that reducing test anxiety is more attainable. Finally, test performance was inferred from self-reports and were not assessed objectively. Study 2 sought to address these limitations.

In Study 2, we told participants in the laboratory that they will take a test later in the experiment. We experimentally manipulated perceived attainability (high vs. low) of reducing test anxiety and tested its effects on test anxiety and performance. In addition to testing the causal effect of beliefs about attainability, Study 2 also allowed us to explore the potential mechanism by which beliefs operate. Emotion regulation involves attempts to change emotions using emotion-targeting strategies. Effective regulation, therefore, likely depends on the motivation to regulate emotion and on the ability to do so effectively (Gutentag, Halperin, Porat, Bigman, & Tamir, 2017). Beliefs about attainability, therefore, might be most effective when people have effective emotion regulation means at their disposal. To test this idea in Study 2, we manipulated both beliefs about attainability and the availability of an effective regulation strategy (i.e., cognitive reappraisal). We predicted that participants who are led to believe that test anxiety can be reduced and are also taught to use cognitive reappraisal would be most effective in reducing their test anxiety, and this would be expressed in better test performance.

Method

Participants

Participants were 142 students (M_{age} = 24.20, SD = 2.34; 69.0% women). All students were eligible to participate, irrespective of their baseline levels of test anxiety. Eight additional participants were omitted from the analyses for failing to pass attention checks (see Oppenheimer, Meyvis, & Davidenko, 2009). Additional 10 participants were omitted from the analyses since they did not correctly understand how to implement cognitive reappraisal.

Procedure

The experimenter informed participants that during the experiment they will be asked to take a test assessing their quantitative abilities under time pressure. They were also told that the test is part of the Psychometric exam, which is an accurate predictor of success in higher education, and that at the end of the experiment their grade will be reported back to them as well as how well it was compared to the other participants in the experiment.

Next, participants rated their current experience of anxiety and worry (1 – very little; 7 – very much; α = .65), along with additional filler items (i.e., concentration, energy, interest, tranquility, calmness). Then, they were randomly assigned to strategy (reappraisal vs. control) x attainability (high vs. low) conditions. To manipulate strategy, participants in the reappraisal conditions received computerized instructions on how to use cognitive reappraisal and were asked to practice, while writing their reappraisals, so we could ensure

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instructions were properly understood and implemented. In the control conditions, participants were not taught anything and skipped to the next part of the study.

Presumably because the study concerned test anxiety, before the quantitative test, participants were asked to read an article that provides background on the topic. In effect, the article was bogus and included the manipulation of attainability. Following Schumann, Zaki, and Dweck (2014), participants in the high attainability conditions read about research showing that test anxiety can be effectively reduced, whereas participants in the low attainability conditions read about research showing that test anxiety cannot be effectively reduced. A pretest on 69 students experiencing some degree of test anxiety (i.e., a score of 2 and above in the Test Anxiety Inventory [Spielberger, 1980; Taylor & Deane, 2002], ranging from 1 to 4) confirmed that reading the high attainability text made participants perceive the attainability of reducing test anxiety as higher (M = 4.63, SD = 1.24), compared to the low attainability text (M = 3.91, SD = 1.19), t(67) = 2.45, p = .017, d = 0.59. After reading the text, participants were asked two reading comprehension questions to confirm that they read and understood the text.

Next, participants were reminded of the impending qualitative test, and were asked to report their perceived attainability of reducing test anxiety. Then, participants were given two minutes to "mentally prepare" for the test. After that, they reported their state test anxiety. Next, participants took a brief test which included five items taken from a quantitative chapter in a practice Psychometric exam that was made publicly available (National Institute for Testing and Evaluation, 2018). Finally, they were asked to report whether they used reappraisal, provided demographic information, and were debriefed.[2]

Materials

Perceived attainability of reducing test anxiety. We used the same item as in Study 1, adapted to the current context ("If you wanted to, to what extent would you be able to reduce your test anxiety during the upcoming quantitative test?"), plus an additional item ("To what extent do you think that reducing your anxiety during the upcoming quantitative test is within your reach?"). The two items were averaged (r = .80).

State test anxiety. We used the same scale as in Study 1 (α = .84).

Test performance. We computed the grade for each participant as the sum of the correct answers given.

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[2] We collected additional measures that were less relevant to the target hypotheses, and so are not mentioned here. We would be happy to do so upon request.

Self-reported use of reappraisal. Participants were asked to rate on a 7-point scale (1 – very little; 7 – very much) their agreement with the following item: "I tried to change my level of test anxiety by changing the meaning I attributed to the test."
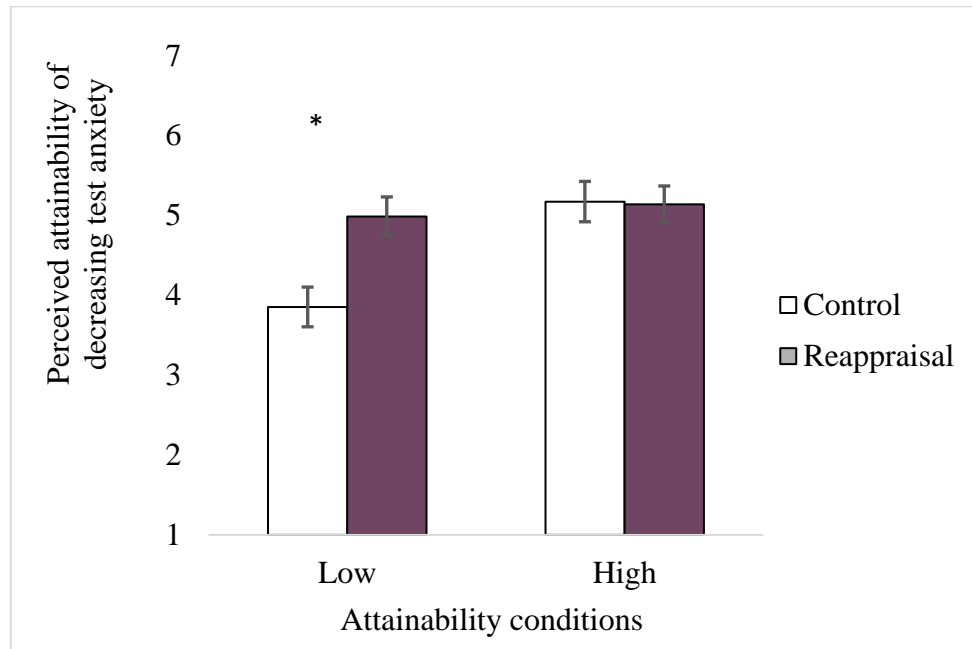
Results.

Manipulation checks

We ran a two-way ANOVA to predict perceived attainability of reducing test anxiety from strategy (reappraisal vs. control), attainability (high vs. low), and their interaction. As expected, there was a main effect for attainability ($F[1,138] = 9.08$, p = .003, partial $\eta^2 = .06$), such that in the high attainability conditions, attainability of reducing test anxiety was higher ($M = 5.15$, $SD = 1.46$) than it was in the low attainability conditions ($M = 4.41$, $SD = 1.51$). Unexpectedly, there was also a main effect for strategy ($F[1,138] = 5.06$, $p = .026$, partial $\eta^2 = .03$), such that in the reappraisal conditions, attainability of reducing test anxiety was higher ($M = 5.07$, $SD = 1.39$) than it was in the control conditions ($M = 4.52$, $SD = 1.64$). Finally, there was a significant strategy x attainability interaction ($F[1,138] = 5.70$, $p = .018$, partial $\eta^2 = .04$). As shown in Figure 1, participants believed that reducing test anxiety was attainable if they were in the high attainability condition, regardless of strategy condition ($F < 0.02$), or if they were taught how to use reappraisal in the low attainability condition ($F[1,138] = 10.19$, $p = .002$, partial $\eta^2 = .07$).

Figure 1

Perceived attainability of reducing test anxiety, as a function of strategy and attainability conditions (Study 2)

We ran a two-way ANOVA to predict self-reported use of reappraisal from strategy (reappraisal vs. control), attainability (high vs. low), and their interaction. Unexpectedly, none of the effects were significant ($Fs < 1.1$), suggesting that our manipulation of reappraisal was unsuccessful.

Test anxiety

We ran a two-way ANOVA to predict state test anxiety, using strategy (reappraisal vs. control), attainability (high vs. low), and their interaction as predictors, controlling for baseline anxiety. We found a main effect for attainability ($F[1,137] = 5.26$, $p = .023$, partial $\eta^2 = .04$), such that participants who were led to believe that test anxiety can be reduced reported lower test anxiety ($M = 1.53$, $SD = 0.60$) than participants who were led to believe that test anxiety cannot be reduced ($M = 1.76$, $SD = 0.71$). There was no main effect for strategy ($F[1,137] = 0.11$, $p = .743$), and no significant strategy x attainability interaction ($F[1,137] = 0.58$, $p = .449$).

Test performance.

We ran a two-way ANOVA to predict test performance, using strategy (reappraisal vs. control), attainability (high vs. low), and their interaction as predictors. Contrary to our hypothesis, there was no main effect for attainability ($F[1,138] = 0.13$, $p = .721$), and no significant strategy x attainability interaction ($F[1,138] = 0.03$, $p = .856$). We found an unexpected main effect for strategy ($F[1,138] = 5.76$, $p = .018$, partial $\eta^2 = .04$), such that in the reappraisal conditions test performance was higher ($M = 3.49$, $SD = 1.00$) than it was in the control conditions ($M = 3.07$, $SD = 1.09$).

Discussion.

As predicted, leading people to believe that reducing test anxiety is more (vs. less) attainable led them to feel less anxious about an upcoming test. This effect was not moderated by having effective means (i.e., reappraisal) to regulate emotions, possibly because our manipulation of reappraisal was ineffective. Attainability influenced test anxiety in the predicted direction, but it did not influence test performance. This finding is consistent with the results in Study 1, suggesting that attainability may impact the experience of test anxiety, but other factors may be stronger predictors of test performance. This finding should be interpreted cautiously, given that the test included only five items, and therefore test scores may not have been reliable. In addition, the test was not personally meaningful, and therefore, participants reported relatively low test anxiety overall, perhaps not high enough to impair performance or require regulation. The effects of reappraisal on test performance should also be interpreted with caution. From a theoretical perspective, if reappraisal affected test anxiety, it should have done so by reducing test anxiety. Yet, the evidence is inconsistent with this interpretation, as test performance was unrelated to test anxiety ($r = .03$). It is therefore possible that training people to use reappraisal increased their level of arousal or interest, which in turn, resulted in better test performance. Future research should try to replicate these findings, using a more reliable, personally-meaningful test, which induces higher levels of anxiety in the studied population.

Conclusion

Taken together, the findings provide preliminary evidence for the hypothesis that leading people to believe that it is possible to reduce test anxiety may contribute to lower test anxiety. Although beliefs about attainability were unrelated to self-reported (Study 1) or objective (Study 2) test performance, test performance was related to test anxiety (at least in Study 1). This suggests that to the extent that beliefs about attainability of reducing test anxiety influence test anxiety, that may have downstream effects on test performance. These preliminary findings provide an impetus to continue studying the potential impact of beliefs about attainability on test anxiety and performance, and whether and to what extent regulation strategies play a role in it.

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