

Stressed for Success:

An Anxiety Reappraisal Video Intervention for Undergraduates

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## Abstract

Students everywhere can feel anxious about exams and are commonly met with the advice to “calm down.” However, researchers have found that it is the worries, not the bodily feelings associated with anxiety, that impair student performance, and thus advice to calm down does not target the harmful part of anxiety. An alternative approach is to target worry by helping students reappraise their anxiety as neutral or beneficial, instead of harmful. Reappraisal messages, delivered in the form of emails or paragraphs, have shown promising results for improving student performance. We tested whether delivering a reappraisal intervention in the form of animated video would improve student performance on a real college exam, compared to a control video describing basic study tips. An online feasibility study (Study 1) confirmed that the reappraisal message was effective at shifting participants’ beliefs about anxiety. Next, we tested whether the reappraisal message could improve student experience and performance in an introductory economics course (Study 2). Additionally, we examined for whom the intervention might work best by measuring baseline anxiety and beliefs about stress. Although the reappraisal message successfully shifted students’ beliefs about anxiety, it demonstrated no effect on performance compared to the control. Baseline measures of anxiety were predictive of performance and how students interacted with the reappraisal message.

## Stressed for Success: An Anxiety Reappraisal Video Intervention for Undergraduates

Exams are a key part of evaluating performance in higher education, yet exam anxiety is widespread among students, sometimes affecting their ability to perform well (Cassady & Johnson, 2002) during these high-stakes testing situations. Because exams have become such significant metrics of success, it is vital that students be able to perform in a way that most accurately reflects their knowledge, free from anxiety's undermining potential. Students are often told to "calm down" when feeling anxious about an exam (Mohler, Hard, Lam, & Brady, 2017), but could the anxious arousal associated with a pending exam actually be used to improve academic performance? Instead of encouraging students to ignore their anxiety, what would happen if we taught students to harness it?

### **Understanding Exam Anxiety**

When students care about performing well on an exam, a certain degree of performance pressure is created (Beilock & Ramirez, 2011). Students experience this performance pressure as anxiety, an experience of arousal equated to a nervous energy. While lay beliefs center on the idea that anxiety is harmful (Johns, Inzlicht, & Schmader, 2008), evidence suggests that experiencing anxiety is not necessarily a negative (Alpert & Haber, 1960; Fevre, Matheny, & Kolt, 2003), and even has the potential to be positive when students channel it into meeting the challenges presented to them (Jamieson, Peters, Greenwood, & Altose, 2016; Fay & Sonnentag, 2002).

Understanding anxiety in our context utilizes the idea that anxiety has two main components: *emotionality* and *worry* (Cassady & Johnson, 2002). *Emotionality* encompasses all of the body's physical reactions, specifically heightened physiological arousal (i.e. heart beating quickly, hands sweating, stomach hurting) while *worry* includes one's cognitive reactions to an

evaluative situation or concerns about the actual test situation (i.e. thinking about the consequences of failure, worrying about evaluation, comparing one's own performance to others). Within limits, emotionality does not typically impair performance and can even enhance performance (Eysenck, 1982). In contrast, the worry component has been consistently found to interfere with performance, particularly as these thoughts distract and intrude (Hembree, 1988). This analysis suggests that the physical aspects of anxiety, while perhaps the most salient aspects of the experience for students, are not actually the source of poor performance. Furthermore, the common recommendation to manage anxiety by "calming down" (Brooks, 2014), which aims to reduce emotionality, is not addressing the part of the anxiety experience that is truly harmful. A more effective approach to combatting the negative effects of anxiety should be to reduce worry rather than emotionality.

### **Prior Interventions**

One way to reduce the worry associated with anxiety is to change the way that students interpret anxiety itself – instead of perceiving anxiety as a detriment to performance, which may amplify their feelings of worry, students can reinterpret anxiety as the body preparing to tackle a task. Reinterpreting anxiety is a form of emotion regulation known as cognitive reappraisal, which changes the construal of a situation so as to reduce its emotional impact (Gross, 2002). Shifting the meaning of the physiological reactions experienced during a stress-eliciting situation can influence how these reactions are experienced (Gross & Jazaieri, 2014). This reappraisal encourages a reinterpretation in line with the understanding of threat and challenge appraisals, where those who recognize stress as threatening perceive the possibility of loss, and those recognizing challenge perceive the possibility of gain with little loss (Tomaka, Blascovich, Kelsey, & Leitten, 1993).

Given that people commonly associate the physiological arousal associated with anxiety as harmful, many approaches to anxiety reappraisal intervene before a stressful situation and try to change this understanding of anxiety. For example, the reappraisal message could encourage people to reinterpret their physiological arousal as representing a positive emotion, like excitement. Reappraising anxiety as excitement (stating “I am excited” instead of “I am anxious”) before singing karaoke or giving a persuasive public speech (Brooks, 2014) increased participants’ subjective feelings of excitement about the tasks and singing accuracy.

Other approaches to anxiety reappraisal encourage people to reinterpret their physiological arousal as something neutral, or even beneficial. The anxiety reappraisal intervention (Jamieson, Mendes, Blackstock, & Schmader, 2010) urges a reconsideration of the acute stress response associated with performance pressure as normal, and functional. One study instructed participants to give an impromptu speech in front of a video camera to compare anxiety regulation strategies – differing instructions were given to reappraise anxiety as a non-threatening reality, suppress any feelings of anxiety, or accept one’s anxiety naturally (Hofmann, Heering, Sawyer, & Asnaani, 2009). The reappraisal group proved to be the most effective in regulating anxiety, while the suppression group demonstrated the greatest increase in heart rate and the highest feelings of anxiety, further suggesting the ineffectiveness of advice to “calm down.” Anxiety reappraisals have also demonstrated the potential to improve student performance. Students performed better on the math portion of the GRE (Jamieson et al., 2010) when they received additional instructions explaining that arousal improves performance, compared to those who did not receive these instructions. Other researchers have even gone a step further in trying to change broader beliefs about the nature of stress through a stress mindset

intervention (Crum, Salovey, & Achor, 2013). This intervention aims to influence broader beliefs about stress and its influence in our lives.

Promising results of anxiety reappraisal interventions have been demonstrated in actual college classrooms as well. In a community college's mathematics course, students received reappraisal instructions explaining the adaptive benefits of arousal, or instructions to ignore their anxiety. Students who received the reappraisal message had less evaluation anxiety and performed relatively better than those receiving the instructions to ignore their stress (Jamieson et al., 2016). Additionally, Brady, Hard, and Gross (2017) found promising effects of this reappraisal advice for first-year students in an introductory psychology course. Their reappraisal intervention involved an email message sent the night before the first exam in the course. First-year students who received the message experienced decreased worry and increased performance on their exam the next day, with lingering effects on later exams that boosted overall course performance.

### **Remaining Questions**

These initial findings suggest the potential of anxiety reappraisal to be a powerful tool for students, but several questions remain. First, *is there a more compelling format to deliver a reappraisal message?* There have been difficulties replicating the benefits of anxiety reappraisal delivered to students via email (Hard, Beers, Brady, & Hill, 2018). Additionally, reappraisals delivered via email make it difficult to accurately track who actually views the message and pays close attention to it. Thus, the goal of this research is to create a robust reappraisal intervention targeted at exam anxiety in college students that can be accurately monitored and will be more motivating, engaging, and salient to students.

Second, *are reappraisal intervention benefits still notable with a stronger control?*

Whereas prior studies had used a “do nothing” control, we planned a control group that would receive different information in an identical manner as those receiving the reappraisal message so as to remain consistent and believable. Third, *how do the benefits of an anxiety reappraisal intervention extend to other courses where students are expected to feel anxious?* We focused our study on an introductory economics course at a selective, private university, with a reputation of being a particularly challenging class. In an extremely high-anxiety environment, we expected that a reappraisal message may be particularly helpful as students would have concrete experiences with anxiety to reappraise. On the other hand, we considered the possibility that the reappraisal instructions would be ineffective in an extremely emotional environment (Shafir, Schwartz, Blachert & Sheppes, 2015).

Fourth, *who most benefits from a reappraisal intervention? Do students with higher levels of test anxiety benefit more, or less, than those with less anxiety? Do beliefs about stress influence reappraisal effects?* The present study explored whether baseline anxiety levels and baseline beliefs about stress shape the effectiveness of the reappraisal message on their own. Participants were asked about their typical behavior in situations of anxiety, whether they believed that stress was more enhancing or debilitating, and what expectations they had regarding the exam and course. Finally, *what reasons do students cite as the source of their anxiety, and will these reasons influence reappraisal benefits?* We examined the many different reasons that students experience anxiety, and which were most influenced by the reappraisal message.

## Overview of Studies

We created anxiety reappraisal videos, and a control video, using Vyond (GoAnimate Inc., San Mateo, CA) animation software. Research suggests that videos have positive effects in academic settings, like increased comprehension when learning new foreign languages (Herron, Hanley, & Cole, 1995). Additionally, students enjoy videos, and videos are able to hold student interest (Canning-Wilson, 2000).

With our new reappraisal intervention, we aimed to 1) more accurately track students that receive, and spend reasonable time watching the video 2) engage students in a way that naturally appeals to them 3) look deeply into a high-anxiety classroom environment 4) gain better insight into baseline student anxiety and beliefs and 5) more clearly recognize the many unique student experiences of anxiety while identifying who most is, or is not, benefitting from anxiety reappraisal messages.

We predicted that the use of our anxiety reappraisal message would successfully influence beliefs about anxiety. More so, we hypothesized that participants that received the reappraisal message would outperform those that received the control message. Finally, we expected that there is a target population that will be most influenced by an anxiety reappraisal message – those with moderate beliefs about anxiety.

Our videos were piloted on Amazon's Mechanical Turk platform (Study 1) and assessed for clarity and effectiveness. The videos were then delivered to students enrolled in a large lecture course in a real college classroom (Study 2). This allowed us to explore the reappraisal message's impact on students faced with genuine exams and anxiety. At the beginning of the term, we gathered several baseline measures to gauge students' expectations for the course, initial anxiety about exams (Cassady & Johnson, 2002; Morris, Davis, & Hutchings, 1981), and



beliefs about the positive and negative effects of stress (Crum et al., 2013). Students were randomly assigned to see one of the two video versions (reappraisal or control) just prior to their first exam. We measured their performance on that exam, as well as their self-reported feelings soon afterward. Additionally, we tracked student performance on exams for the remainder of the term.

### **Video Stimulus Creation**

Three different animated videos were created – scripts for these videos can be found in Appendix A (1, 2, 3). The reappraisal video described the potential for anxiety to be beneficial for performance (1:35 min long). It aimed to clearly and simply state our desired message of anxiety’s ability to be beneficial. An extended reappraisal video communicated the identical reappraisal message with the addition of three examples detailing other ways that anxiety can be beneficial (i.e. asking someone out on a date, playing in a big soccer match, or springing into action to help a friend) (2:20 min long). This message was designed to demonstrate other clear applications of the reappraisal, in the hopes of increasing the probability of using the video’s advice. Finally, a control video described basic research-based study tips that students had likely heard before from teachers and other students (1:39 min long). We expected these tips would be familiar, and relatively inert as a result.

### **Study 1: Feasibility Study with an Online Sample**

Before testing the reappraisal and control videos in a college classroom, we first conducted a feasibility study with an online sample of current and recent college students on Amazon’s Mechanical Turk to ensure that 1) the reappraisal video was effective at changing beliefs about anxiety and 2) that the reappraisal and control videos were otherwise matched in terms of their perceived usefulness and enjoyability. In Study 1a, participants were asked to

imagine taking their first exam in a new class and were then presented with either the reappraisal, extended reappraisal, or control video. Study 1b was identical except that participants only viewed the control or reappraisal video, not extended reappraisal, and also underwent a timed evaluative test experience. Because the studies were nearly identical in methods, we analyzed data from the two studies together.

## **Method**

**Participants.** For study 1a, 198 participants were recruited using Amazon's Mechanical Turk. Ultimately, 133 participants were included in the final sample after exclusions for incomplete surveys, the use of copy/paste, self-reported distractions, and other reported technical problems. The participant pool was limited to those with a 95+ approval rate, residing in Canada or the United States, who designated themselves as full-time college/university students. Fifty percent of participants identified as male, 49.2% identified as female, and 0.8% as transgender. In terms of college attendance, 43.9% reported graduating from college, 52.3% reported being currently enrolled, and 3.8% reported previously attending college for some time – due to the nature of an online participant pool, participants may have designated themselves as full-time students at their time of enrollment in Mechanical Turk, but not have updated this information since joining. Of those who reported attending college in the past, 21.9% of participants reported being in college within the last year, 18.8% one to two years ago, 15.6% two to three years ago, 14.1% three to four years ago, and 29.6% more than four years ago. 70.1% of participants identified as White, 11.9% as Asian, 8.2% as Black, 4.8% as Hispanic, 0.7% as American Indian or Alaska Native, and 4.3% as a mix of multiple races.

For study 1b, 300 participants were recruited in the same way, with data excluded from 13 participants for various reasons: duplicated (i.e. copy and paste) responses to free response

questions, a failed attention check, or identical selections on all Likert scales. Of the 287 participants included in the final sample, 47.0% identified as male, 50.9% identified as female, and 2.1% as transgender. In terms of college attendance, 50.7% reported graduating from college, 42.3% reported being currently enrolled, and 7.0% reported previously attending college for some time. Of those who reported attending college in the past, 28.4% of participants reported being in college within the last year, 16.0% one to two years ago, 12.4% two to three years ago, 16.0% three to four years ago, and 27.2% more than four years ago. 59.2% of participants identified as White, 14.3% as Black, 9.4% as Asian, 8.7% as Hispanic, 1.0% as American Indian or Alaska Native, 1.0% as other, and 6.4% as a mix of multiple races.

**Procedure.** Participants completed a 20 to 30-minute survey designed with Qualtrics online survey software for paid compensation. After consenting to participate, participants were asked to imagine a hypothetical experience of taking a first big exam in a new class. The survey asked for baseline feelings about exam anxiety and worries, assessed by two measures. The 10-item Worry-Emotionality Questionnaire (Morris et al., 1981, Appendix B) measured participants' typical feelings before the first exam in a new class on a 5-point Likert scale, where 1 indicated "does not describe my feelings" and 5 indicated "clearly describes my feelings." Additionally, five items from the Cognitive Test Anxiety Scale (Cassady & Johnson, 2002, Appendix C) assessed typical feelings during the first exam in a new class on a 4-point scale where 1 indicated "not at all typical of me" and 4 indicated "very typical of me."

Participants were then randomly assigned to see one of the three video versions (control, standard reappraisal, or extended reappraisal). A variety of questions were designed to probe whether the different videos were equivalent on various characteristics. Participants answered five questions that addressed video effectiveness [how engaging/how informative/how clear/how

relevant/how much new learning] assessed on a 5-point Likert scale. Participants had the opportunity to elaborate in provided free response boxes on the relevance of the videos to themselves and on whether they had learned anything new. Six items targeted student feelings [how anxious/how worried about feeling anxious/how confident/how excited/how encouraged/how confused] towards their hypothetical exam after watching the video measured on a 7-point Likert scale where 1 denoted “not at all” and 7 denoted “extremely.” Four items highlighted the advice received, and likeliness to use the advice in the future (“How likely do you think you would be to think about or use this advice on your upcoming exam? How likely do you think you would be to think about or use this advice on any future exam? How likely would you be to think about or use this advice in a domain or activity outside of academics? To what extent do you think this advice would or might backfire, leading you to feel more anxious or perform worse on the exam?”). Three items targeted participant opinions of the professor who sent the video [how likable/how competent/how caring], and two about their expectations for the exam [how fair/how enjoyable], all measured on 5-point Likert scales. One free response question was posed about participant memory about the video.

Additional questions examined how the videos influenced participants’ beliefs about anxiety. Two items asked about anxiety’s ability to affect performance [helpful/hurtful] measured on a 5-point Likert scale with 1 indicating “extremely” and 5 indicating “not at all.” One item asked participants to make a binary choice: “If forced to choose, would you say anxiety more likely hurts or helps performance on a test?”.

In Study 1a, participants were assigned to see either the control, standard reappraisal, or extended reappraisal video. In Study 1b, participants viewed either the control or standard reappraisal video, based on preliminary findings from Study 1a that the two reappraisal videos

were perceived as equally effective, but the standard reappraisal video was rated as having more useful advice for the upcoming, and future, exams. Participants in Study 1b also completed a timed evaluative test experience to capture possible effects of the videos on immediate performance (Appendix E). The test included 20 questions covering simple math and analogies, with participants given 15 seconds to complete each question with the hope of generating modest stress. The questions asked were straightforward problems, only intended to be challenging due to the time pressure.

Participants in both studies were then asked how fully they had attended to the survey, ten questions about basic demographic information, and were given the option to comment on issues encountered while taking the survey or any other concerns.

### **Analysis Preparation**

A factor analysis was used to determine how to score the Cognitive Test Anxiety Scale, CTA, (Cassady & Johnson, 2002), as we chose a 5-question subset of their 27 original measures. For the pilot studies (Study 1a and 1b), CTA loaded together onto one factor, so an average CTA score was calculated by averaging our five CTA measures. The Worry-Emotionality Questionnaire, WEQ, (Morris et al., 1981), includes two subscales, one to measure emotionality and one to measure worry. WEQ worry and WEQ emotionality are averages of the measures that compose each sub-scale. Appendix G details the specific measures that went into each of these variables. Statistical significance was determined by a *p*-value greater than an alpha level set to 0.05. We report effect sizes and confidence intervals.

### **Results and Discussion**

**Were baseline measures of anxiety different between video conditions?** Our first concern was to determine that random assignment was successful, as we predicted that baseline

measures of anxiety may influence how video messages were received. Table 1 provides descriptive statistics for baseline measures of anxiety broken down by study and measured together. All measures were reliable using Cronbach's alpha ( $\alpha = .895$ ). Baseline measures were not statistically different between condition groups indicating that random assignment was in fact successful.

**Were videos rated similarly on measures of effectiveness?** We wanted to ensure that both the control and the reappraisal videos were rated similarly on various measures of video effectiveness. This ensured that participants received a fairly equivalent experience besides actual video content. There was no significant difference between video conditions in terms of the video being engaging ( $R^2 = .004$ ,  $F(1, 377) = 1.47$ ,  $p = .227$ ), informative ( $R^2 = .000$ ,  $F(1, 377) = 0.12$ ,  $p = .726$ ), clear ( $R^2 = .005$ ,  $F(1, 377) = 1.74$ ,  $p = .189$ ), and relevant ( $R^2 = .003$ ,  $F(1, 377) = 1.02$ ,  $p = .313$ ) to viewers.

**Did the reappraisal video affect participants' feelings about the videos and their beliefs about anxiety?** A next question was whether the reappraisal videos successfully convinced participants that anxiety could be helpful; future analyses only consider those participants that saw the control or standard reappraisal video, excluding those participants who saw the extended reappraisal in Study 1a. This choice was made to more similarly reflect the experience of those in Study 1b, after the standard reappraisal was rated as having more useful advice for viewers. After watching their assigned video (reappraisal or control), participants reported significantly different feelings across video conditions. A univariate analysis of variance (ANOVA) revealed that participants who watched the reappraisal video reported learning more new information from the video ( $M = 3.49$ ) compared those who watched the control video ( $M = 2.97$ ),  $F(1, 367) = 11.72$ ,  $p = .001$ ,  $\eta_p^2 = .031$ . The reappraisal video also

influenced viewers beliefs about anxiety. Members of the reappraisal group rated anxiety as significantly more helpful than those in the control group,  $F(1, 367) = 10.14, p = .002, \eta_p^2 = .027$ , suggesting that the reappraisal message about the beneficial potential of anxiety was persuasive.

Additionally, we analyzed participants' binary choice of whether anxiety helps or hurts performance. According to a chi-square test of association, there was a statistically significant difference in the belief that anxiety helps or hurts among the different video conditions, as shown in Table 2. Members of the reappraisal group were more likely to select that anxiety helps than those in the control condition,  $\chi^2 (1, N = 380) = 18.06, p < .001, r = -.218$ . These results again confirm that the reappraisal video persuaded participants that anxiety is helpful.

**Did the reappraisal video affect participants' feelings toward their upcoming imagined exam?** We also considered the way in which the reappraisal message would specifically influence feelings about the upcoming imagined exam. Reappraisal participants reported feeling more anxious about the upcoming imagined exam,  $F(1, 367) = 4.16, p = .042, \eta_p^2 = .022$ . On the surface, such a finding implies that the reappraisal message might have backfired, making participants feel worse. But given that the reappraisal message advised participants that anxiety could be helpful, it is also possible that participants translated this heightened anxiety as something positive. Consistent with this view, reappraisal participants also reported higher positive feelings of excitement towards the upcoming exam compared to control participants,  $F(1, 367) = 4.52, p = .034, \eta_p^2 = .009$ . Additionally, reappraisal viewers reported more confusion,  $F(1, 367) = 10.74, p = .001, \eta_p^2 = .005$  suggesting the advice received by the reappraisal group may be more novel. However, those in the reappraisal group reported a significantly higher belief that the advice they received would backfire,  $F(1, 367) = 14.40, p <$

.001,  $\eta_p^2 = .038$  compared to the control group's belief about their message. Given that common wisdom is that anxiety hurts, this finding suggests that participants might not have been fully persuaded by the message.

**Did the reappraisal video affect participant performance on the timed evaluative test experience (Study 1b)?** Video condition had no effect on scored performance on the 20-question timed evaluative test experience: control ( $M = 14.22$ ,  $SD = 4.09$ ) and reappraisal ( $M = 13.75$ ,  $SD = 4.41$ ) scores were extremely similar. After completing the assessment, those in the reappraisal group reported feeling more anxious,  $F(1, 285) = 6.40$ ,  $p = .012$ ,  $\eta_p^2 = .022$ , and more worried about feeling anxious,  $F(1, 285) = 3.84$ ,  $p = .051$ ,  $\eta_p^2 = .013$ , than those in the control group. However, these feelings were not correlated with worse performance on the test experience. The timed evaluative test experience was not a very authentic testing situation, and it is possible that participants may have been responding to the fact that the reappraisal video simply called more attention to anxiety.

### **Study 2: Classroom Intervention**

From our previous study, we learned that a reappraisal message in animated video successfully influenced beliefs about anxiety and confirmed that it was similar in other characteristics to a control message describing study skills. The goal of this study was to determine if our animated reappraisal video could help improve student experience and performance on an actual college exam when compared to a control video describing basic study tips. Our reappraisal message aimed to communicate the message in an effective, trackable way, while learning more about students' unique anxiety experiences. We paid careful attention to the selection of the course in which to test the video, wanting to target a high-anxiety course, outside of the psychology domain. The introductory economics course at this university offered



a unique opportunity to intervene in a predominately first-year populated class, with notoriously difficult, and anxiety-invoking evaluations. Students answered baseline measures of expectations for the course, initial exam anxiety (Cassady & Johnson, 2002; Morris et al., 1981), and beliefs about stress (Crum et al., 2013), so that we could identify how students' baseline characteristics were interacting with receipt of the video messages. Students were shown the same standard reappraisal and control videos tested in Study 1, and course performance was tracked throughout the semester.

## **Method**

**Participants.** Participants were 221 students enrolled in a single section of an introductory economics course at a selective private university. The course was taught in a team-based learning format with optional discussion sections to review course assignments. Nearly all (98.9%) students completed at least some measures of the study. Of these students, 190 students (86.0%) consented to allow their course data to be analyzed for the study. The vast majority of the students (98.4%) were first-year students; only one student (0.5%) was a sophomore, and two (1.1%) were juniors.

**Procedure.** The study took place in the standard and typical practices of the course and unfolded in four phases. At each phase, students were offered a survey programmed in Qualtrics survey software that asked students for feedback about the course in exchange for a small amount of extra credit. Measures for the study were embedded within these surveys. All procedures were approved by the campus' Institutional Review Board.

***The baseline phase.*** The goal of the baseline phase was to gain insight into students' baseline feelings about anxiety and stress, which would later be compared to performance. In the baseline phase, delivered during the first two weeks of the semester, students completed

several measures of their course expectations and feelings about exams. Students answered four questions regarding course and exam expectations, assessed on a 5-point Likert scale with 1 denoting “extremely” and 5 denoting “not at all” (“How difficult do you expect this course to be? How [fair/enjoyable] do you think exams in this course will be? How important is it to you to do well in this course?”). As in Study 1, participants completed items from the Worry-Emotionality Scale (Morris et al., 1981, Appendix B) and five from the Cognitive Test Anxiety Scale (Cassady & Johnson, 2002, Appendix C). We additionally measured students’ broader beliefs about whether stress is enhancing or debilitating, using the Stress Mindset Scale (Crum et al., 2013). The scale includes eight items scored on a 5-point Likert scale, ranging from “strongly agree” to “strongly disagree” (see Appendix D). More positive scores on the scale indicate that students believe that stress is more enhancing than debilitating.

***The intervention phase.*** During the intervention phase, students were randomly assigned to view the control or reappraisal video. Four days before their first big evaluation in the class, students were invited to view the video and answer some questions related to the upcoming exam in exchange for modest extra credit. Students completed the phase in its entirety within the four days leading up to the day of their evaluation. The video was followed by a set of questions designed to address students’ feeling about the upcoming exam, feelings about the video that they just watched, and their belief that anxiety is more likely to help or hurt performance. Students answered the same seven items used in Study 1 to assess students’ feelings about their upcoming exam [e.g., how anxious/how worried about feeling anxious/how confident/how excited/how encouraged/how confused]. A free response question probed how much students remembered about the video (“To the best of your memory: what, if anything, did the video say regarding feeling anxious about an exam?”). As in Study 1, students also responded to four

questions, evaluated on a 5-point Likert scale, that assessed video relevance, amount of learning from the video, and likeliness of using the advice on their examination and in the future. A binary choice item asked students to indicate whether anxiety more likely helps or hurts performance (“If forced to choose, would you say anxiety more likely hurts or helps performance on a test?”).

***The post-exam phase.*** In the post-exam phase, delivered immediately after their evaluation, students reported post-exam feelings of anxiety, worry, and confidence, similar to those used by Brady, Hard, & Gross (2017). The goal of the post-exam phase was to gauge students’ experiences during the exam and specific reasons for feeling anxious. Five items regarding student feelings [how anxious/how worried about feeling anxious/how worried/how confident/how unsure] were repeated from the intervention phase, now concerning the evaluation just completed. Students were also asked to identify (i.e., “check off”) which reasons for feeling anxious, if any, were relevant to them while taking the evaluation (e.g., I did not get enough sleep last night, I felt less prepared than other students in the class), seen in Appendix F.

***The follow-up phase.*** In the follow-up phase, given at the end of the semester, students reported what, if anything, they remembered about the video that they watched before their first evaluation, as well as their beliefs about the effects of anxiety on performance. The purpose of this phase was to encourage student reflection on the course, and track beliefs about anxiety across the semester. Four questions were altered from the baseline anxiety survey targeting student reflection on their experience in the course (“How difficult have you found this course to be? How fair have you found exams in this course to be? How enjoyable have you found exams in this course to be? As of this point in the semester, how important is it for you to do well in this course?”). Students were again asked to choose if anxiety more likely helps or hurts

performance and were given a free response question to assess if their strategies in handling exam anxiety had changed across the semester. The survey also asked for student consent to analyze course materials and educational records for research purposes.

### **Analysis Preparation**

As for Study 1, we used a factor analysis to determine how to score the 5-question subset we selected from the Cognitive Test Anxiety Scale, CTA, (Cassady & Johnson, 2002). Recall that in Study 1, these items loaded onto a single factor. For the present study, however, CTA loaded onto two separate factors (see Appendix G). The first we describe as CTA-anxious, which included items such as “during a course examination, I get so nervous that I forget facts that I really know.” The second we refer to as CTA-challenge, which appeared to capture the difference between viewing beliefs as a challenge or threat. The eight items comprising the stress mindset scale (SMS) were averaged to create a single measure of stress mindset (i.e., the belief that stress is enhancing). For all analyses, statistical significance was determined by a  $p$ -value less than an alpha level set to 0.05. We report effect sizes and confidence intervals.

### **Results and Discussion**

**What were students’ baseline course expectations, test anxiety, and beliefs about stress?** Our first question was whether random assignment was successful in terms of the various baseline measures, as we believed that baseline measures would be predictive of grades. Table 3 provides descriptive statistics for each baseline measure by video condition. For nearly all baseline measures random assignment was successful: there were no differences between video conditions across WEQ worry ( $R^2 = .008$ ,  $F(1, 151) = 1.27$ ,  $p = .261$ ), WEQ emotionality ( $R^2 = .000$ ,  $F(1, 151) = 0.02$ ,  $p = .904$ ), CTA-anxious ( $R^2 = .000$ ,  $F(1, 151) = 0.08$ ,  $p = .776$ ) or CTA-challenge ( $R^2 = .001$ ,  $F(1, 151) = 0.01$ ,  $p = .932$ ). The one exception was in regard to student

stress mindset. A univariate ANOVA revealed that students in the reappraisal group had a slightly higher baseline stress mindset score,  $F(1, 162) = 4.23, p = 0.041, \eta_p^2 = 0.025$ , meaning that students in this group viewed stress as more enhancing. Given that students' default beliefs about the nature of stress may predict exam performance, this measure was included as a control variable in future analyses to control for baseline differences. There were no differences in course expectations at the multivariate or univariate level across groups. Overall, students in Study 2 perceived their course to be extremely difficult, with a mean difficulty score of 4.60 ( $SD = 0.53$ ) out of a maximum 5.

**Did any baseline characteristics predict exam performance?** We expected that baseline stress beliefs, or stress mindsets, may predict performance. Indeed, they did – students' average stress mindset score was marginally correlated with ( $r(162) = -0.195, p = 0.073, \eta_p^2 = 0.020$ ) performance, with a stress-is-enhancing mindset associated with better exam scores. A univariate analysis of variance (ANOVA) revealed that beliefs about the difficulty of the course strongly predicted Exam 1 scores ( $t(136) = -4.06, p < .001, \eta_p^2 = 0.169$ ), such that those who believed the course would be more difficult at the start of the term performed worse on Exam 1. Other measures of course and professor expectations, WEQ measures, and CTA measures did not correlate with Exam 1 performance. Exam 1 performance was also not correlated with whether students expected exams in the course to be fair or enjoyable or saw doing well in the course as important.

**Was the reappraisal video successful in changing beliefs about anxiety?** Immediately after viewing the video, students reported their beliefs about anxiety and feelings about their upcoming exam. A logistic regression revealed that the reappraisal video successfully affected beliefs about anxiety, as determined by the binary choice that anxiety helps or hurts performance,

even controlling for baseline characteristics. Baseline measures corresponded to beliefs – a more stress-is-enhancing mindset significantly increased the log odds of marking anxiety helps, rather than anxiety hurts, by 1.00 point per stress mindset level ( $z = 3.54, p < .001$ ). Even given this, we found that watching the reappraisal video significantly increased log odds of selecting that anxiety helps, instead of anxiety hurts, by 1.02 ( $z = -2.82, p = .005$ ). These findings are illustrated in Figure 1.

**Did the reappraisal video change any other feelings?**

Video condition had no significant effect on post-video feelings, feelings of video relevance to student lives, or likelihood of using video advice now or in the future. Members of the reappraisal group were marginally more likely to report that they learned something new from their video,  $t(157) = 1.85, p = .066, \eta_p^2 = 0.021$ , than those in the control group.

**Did the reappraisal video impact Exam 1?** A key prediction was that the reappraisal video would help students perform well on Exam 1, but this prediction was not confirmed. Watching the reappraisal video rather than the control video had no effect on Exam 1 scores, controlling for stress mindset. The average score for Exam 1 ( $n = 175$ ) was low: 73.58 points ( $SD = 19.36$ ) out of 200, or 36.8%.

**Did the reappraisal video interact with any baseline characteristics?** Recall that baseline characteristics were measured because we believed that these might be moderators of the reappraisal video's effect. *Did any baseline characteristics moderate whether the videos had an effect on Exam 1 score?* Feeling challenged, rather than panicky, when receiving a test (CTA challenge) significantly interacted with the reappraisal message ( $t(136) = 2.04, p = .044, \eta_p^2 = 0.030$ ) to affect Exam 1 performance. For students in the reappraisal condition compared to the

control condition, feeling challenged by exams was associated with better Exam 1 performance,  $t(136) = 2.04, p = .044$ , seen in Figure 2; there was no effect for students in the control group.

***Did the reappraisal video affect post-exam feelings after Exam 1?*** We had predicted that the reappraisal message would affect post-exams feelings after Exam 1, reducing worry specifically. These predictions were not confirmed, and in fact the reappraisal video affected post-exam results in the opposite direction as predicted when controlling for stress mindset (measured at the beginning of the semester). Compared to the control video, the reappraisal video significantly increased feelings of being worried about performance  $F(1, 147) = 5.17, p = .024, \eta_p^2 = 0.041$ . The average difference in worry score (out of 5) across video conditions was equal to 0.55,  $t(147) = 2.52, p = .013$ . We believe that this may signal that the reappraisal video was bringing up a new awareness of anxiety, and concerns that come with this. No significant differences existed between the reappraisal message and post-exam feelings of being anxious, worried about feeling anxious, confident, or unsure about performance on the exam.

***Did baseline characteristics moderate the effect of the reappraisal video on post-exam feelings?*** A single MANOVA revealed that many baseline characteristics were associated with post-exam feelings but did not interact with the video that participants viewed. WEQ emotionality,  $F(144) = 4.50, p < .001$ , WEQ worry,  $F(144) = 6.01, p < .001$ , course difficulty,  $F(144) = 3.19, p = .009$ , exam enjoyment,  $F(144) = 3.89, p = .003$ , and course importance,  $F(144) = 3.82, p = .003$ , were all significantly associated.

***Did reappraisal differentially affect students who endorsed vs rejected the message?*** Not all students who saw the reappraisal video were convinced of the message. *How did we explore the difference between reappraisal viewers?* Members of the reappraisal group were re-categorized based on whether they indicated that anxiety helps or hurts performance after

viewing: those who endorsed the message to reappraise their anxiety (said anxiety “helps;”  $n = 39$  students, 46.4%), and those who rejected the message (said anxiety “hurts;”  $n = 45$  students, 53.6%). These two subgroups of the reappraisal condition were then compared to the control condition.

A first question we asked about these subgroups was whether they differed on any baseline characteristics. The three groups (control, endorsement, and rejection) differed in average stress mindset,  $F(2, 158) = 3.77, p = .026, \eta_p^2 = 0.046$ . The endorsement group was more likely to have a stress-is-enhancing mindset by an average of 0.37 points at the beginning of the term than the control group ( $t(158) = 2.73, p = .019$ ); no other pairwise comparisons were significantly different. We knew that students with a stress-is-enhancing mindset at the beginning of the term were more likely to say that anxiety helps during the intervention phase of the study, thus it was possible that those who watched the reappraisal video and endorsed its message were students who already believed that stress and anxiety were beneficial. However, compared to the control group, those in the endorsement group reported that they had learned more new information from the video,  $t(156) = 2.06, p = .041, \eta_p^2 = 0.027$ , suggesting that those who endorsed the reappraisal message were also successfully persuaded by the video.

When the endorsement group ( $M = 76.21$  points) was compared to the control group ( $M = 75.02$  points) ( $n = 88$  students), there was still no significant effect on Exam 1 performance. But, those in the rejection group performed marginally worse on Exam 1 than the control group, by an average of 6.33 points,  $t(156) = -1.76, p = .080, \eta_p^2 = 0.020$ .

***How were reasons for being anxious related to performance?*** Recall that students identified particular reasons for being anxious after taking their exam (Appendix F). Marking “thinking about things unrelated to the quiz” was associated with lower exam scores,  $t(129) = -$



2.45,  $p = .015$ ,  $\eta_p^2 = 0.045$ , as people who endorsed this reason for feeling anxious scored 20.59 points lower on their first exam compared to the control group.

A separate look at each of the three sub-groups revealed that it was largely the rejection group that showed this negative relationship: the rejection group scored 26.02 points worse on Exam 1 than the control group,  $t(117) = -2.71$ ,  $p = .008$ ,  $\eta_p^2 = 0.064$ . There was no significant difference in performance between the endorsement and control group members that selected “thinking about things unrelated to the quiz” as their reason for being anxious. No other reasons for being anxious were related to exam scores or interacted with the reappraisal.

**Did the reappraisal video have lasting effects for students?** Although there was no evidence that the reappraisal video influenced Exam 1 scores, we also looked at downstream consequences of the reappraisal message on the second exam and on end-of-term grades. Still accounting for average stress mindset scores, the reappraisal video significantly influenced Exam 2 scores,  $t(145) = -2.78$ ,  $p = .006$ ,  $\eta_p^2 = 0.051$ , where those in the control condition outperformed those in the reappraisal condition by an average of 10.07 points, or around 5%. The average score for Exam 2 ( $n = 158$ ) was similarly low to Exam 1 – 71.33 ( $SD = 21.59$ ) out of 200 points, or 35.7%.

Looking separately at the rejection and endorsement groups within the reappraisal condition revealed that both groups performed worse on Exam 2 than the control group ( $p = .021$ ,  $\eta_p^2 = 0.053$ ). The rejection group performed significantly worse, 11.61 points lower, than the control group ( $t(141) = -2.60$ ,  $p = .010$ ), while the endorsement group performed marginally worse, by an average of 8.66 points ( $t(141) = -1.88$ ,  $p = .062$ ).

At the end of the term, students in the control group performed better in the course overall by an average of 50.67 total course points (out of 800), compared to those in the

reappraisal group ( $t(161) = -2.58, p = .011, \eta_p^2 = 0.040$ ). This was driven largely by those in the rejection group who performed, on average, 59.68 points worse than the control group ( $t(157) = -2.49, p = .014, \eta_p^2 = 0.042$ ). The endorsement and control groups did not significantly differ on total scores. Table 4 shows exam and final scores broken down by video condition.

### **General Discussion**

Exam anxiety is widespread among students, and thus it is important that efforts be made to mitigate the negative effects of anxiety on student performance. This study examined the effects of using a new delivery mechanism, animated video, to communicate an anxiety reappraisal message to undergraduate students. With prior research indicating positive results of using video in the classroom (Canning-Wilson, 2002) we believed that communicating the reappraisal message in this way would be compelling and motivating to students. We hoped that our reappraisal message would influence student beliefs about anxiety, help to improve student performance, and allow us to identify a population for which these reappraisal messages may be most effective. We conducted two studies – 1) a feasibility study with an online sample on Amazon's Mechanical Turk and 2) a classroom intervention study in an introductory economics course.

#### **Reappraisal Video Impact on Feelings About Anxiety**

Consistent with our predictions, the reappraisal video successfully persuaded participants that anxiety could be beneficial. In both Study 1 and Study 2, those in the reappraisal group reported a greater belief that anxiety helps, instead of hurts, compared to the control group. This shift in belief was consistent with our message of reappraising anxiety as something that can be beneficial and demonstrated successful encouragement and application of our message.

Results indicated further ability of the reappraisal message to influence viewers' feelings and beliefs. In Study 1, those in the reappraisal group reported being more anxious for their upcoming exam. Brady, Hard, and Gross (2017) had found that upperclassmen felt more anxious after receiving their emailed reappraisal message, so it was not surprising that Mechanical Turk participants would also respond in this way. While on the surface this could indicate risk of negative interpretation of our message, we interpreted results to reasonably indicate that participants internalized video advice and may have indicated more anxiety as something beneficial due to the message they had just received. In line with this interpretation, reappraisal viewers also reported feeling more excited for their upcoming exam, compared to control participants, demonstrating a positive view of anxiety in line with our message. Additionally, while reappraisal participants did indicate a greater belief than control participants that video advice had the potential to backfire, this most clearly suggested to us that the reappraisal advice was extremely different from advice participants had received previously. This novelty was highlighted by reappraisal viewers reporting more confusion about video advice. Across Study 1 and Study 2, viewers also reported more learning after watching the reappraisal video, further emphasizing that the reappraisal message was new, and as with anything heard for the first time, striking.

### **Impacts on Performance**

We had predicted that participant performance would benefit from receiving the reappraisal message, as emotion reappraisal has been consistently found to be the most effective means of regulating emotions, and particularly the subjective feeling of anxiety (Hofmann et al., 2009). But, our results demonstrated no evidence that the reappraisal was helpful compared to the control message. This was contrary to prior research that had seen performance benefits of a

similar written reappraisal message for students taking the GRE (Jamieson et al., 2009) and for first-year students in an introductory psychology class who received the message via email (Brady et al., 2017).

In Study 1, there was no effect on score for those who received the 20-question timed evaluative test experience across conditions. The timed evaluative test experience did not closely emulate a real exam environment, so we were eager to see performance effects in an actual classroom. But, in Study 2, we saw consistent results demonstrating that watching the reappraisal video, compared to the control video, had no effect on Exam 1 performance. Additionally, reappraisal students reported that they felt more worried about their performance after completing the exam. While we had hoped that the reappraisal message would work to reduce student worry about performance by pointing out the adaptive nature of their anxiety, we speculate that the message may have actually worked to draw more attention to anxiety. After hearing the reappraisal message, students could have been made more acutely aware of their uneasy feelings about their exam performance, and thus would report more concerns about their score as this awareness was made stronger. Looking at downstream performance effects of the reappraisal message, we continued to see control viewers outperform reappraisal viewers on both Exam 2 and in terms of total course points earned.

While there is no evidence suggesting that reappraisal advice was helpful compared to the control, the strength of the control must also be recognized. The control video described basic study tips for students, relaying information that most students would have heard before. These tips were communicated in an easily digestible manner, and assuming that the suggestions offered were familiar to students, control advice may have been extremely attractive to those who saw it. Because the reappraisal message offered advice that the majority of viewers were

unfamiliar with, demonstrated by students' higher ratings of learning something new from the reappraisal video, these viewers would have had to exert more effort and energy into first understanding the message, and then applying it. Thus, control advice may have been more successful by nature of viewers only needing to apply somewhat familiar advice.

### **Identifying a Target Student Population**

In the classroom study specifically (Study 2), it was evident that there was a difference between those reappraisal students that endorsed the message, and those that rejected it. Many of our analyses broke the reappraisal group into an endorsement and a rejection group to look more closely at these differences. Reappraisal students across both studies reported concern that the message had the potential to backfire for students, and our results indicated some possible evidence of backfire with students' later performance.

With these results, we speculate that high intensity of emotions may have played a large role in students' response to the reappraisal message. For really intense emotions, distraction has been recognized as the most successful means of coping, rather than reappraisal, as people demonstrate natural distraction preference in these situations (Shafir et al., 2015). For some students in this course, emotions may have been too strong for an anxiety reappraisal, delivered in any form, to be effective.

Further, students demonstrated, through their course difficulty ratings, that they perceived this course to be extremely challenging, so there is reason to believe that these intense emotions were present. For those students who have had negative experiences with anxiety previously or hold strong beliefs that anxiety can only be negative, the reappraisal may have seemed non-affirming, or even caused them to feel alienated in some way. Additionally, some students may just be better at applying reappraisal instructions, due to individual differences and tendencies

(Jamieson, Mendes & Nock, 2013). Students are unique individuals with distinctive experiences, and any one, or combination, of these factors may have moderated performance benefits. These considerations lead us to believe that students with a more moderate level of exam anxiety would have the greatest potential of benefitting from a reappraisal message.

When we again split the reappraisal group into a rejection and an endorsement group, we were able to consider how students' differing in beliefs about the message may perform differently. The rejection group demonstrated worse performance on Exam 1 and Exam 2 than both control and endorsement groups; this indicates that students' responses to reappraisal instructions matter. Thus, for those that saw the reappraisal video, which encouraged an anxiety helps belief, and still chose to report the belief that anxiety more hurts, there is demonstrated reason to believe that having this personal belief rejected, or challenged, can come as its own burden. Perhaps, those students that are not grounded in very strong negative beliefs about anxiety previously are the only ones that would be reasonably reached and convinced with a short reappraisal message.

In trying to understand students more fully, we see consistent results that initial feelings and beliefs are coming out during exam performance. Students that had a baseline more stress-is-debilitating mindset correlated with lower exam scores and were less likely to report an anxiety helps belief. Additionally, students that felt more challenged, rather than panicky, performed better, indicating benefits of having a challenge, over threat, response to exams. Expectations also mattered – those who expected the course to be more difficult performed worse, indicating that this course expectation may have created a degree of a self-fulfilling prophecy as students fell into an experience in line with this expectation.

## **The Course**

It is also vital to consider the course, and classroom, that the reappraisal was run in. This particular introductory economics course had a uniquely high level of difficulty, evident by low-F exam averages. Thus, it is obvious that we ran this reappraisal in a class where perceived difficulty of the course was high, and anxiety was high. On the one hand, such a high level of anxiety could have offered the opportunity for the reappraisal message to be extremely helpful, since students could have been aware of their anxiety and eager to take in helpful advice. But, on the other hand, there seemed to be very little demonstrated likelihood of success. As Jamieson et al. (2013) speculated, motivation is one of the key factors likely needed for a reappraisal to work. Therefore, in the case of students, they would need to be reasonably motivated by their ability to succeed. But, with very little likelihood of performing well in this course, the reappraisal may have been set up to have little impact if students were already not expecting success. Furthermore, while we had been attracted to this economics course because it was outside of the realm of psychology, the psychologically-driven message, although integrated as naturally as possible into the course proceedings, may have still seemed out-of-place. For students, this could have added additional reservations towards trusting the message.

## **Limitations and Future Directions**

Although these studies make notable contributions to the understanding of exam anxiety, several limitations are important to acknowledge. One limitation is that there was no do-nothing control utilized in either study. As previously mentioned, there is a high possibility that the control video communicated an overly helpful message, and thus the benefits of the reappraisal were not seen for this reason; prior research on exam anxiety reappraisals found positive outcomes when comparing reappraisal messages to students receiving no additional message at

all. Thus, if more students were available, the studies would have benefitted from an additional control group that received no video message. Another notable limitation is that the reappraisal was only tested in one actual college classroom. The feasibility study was necessarily run with online participants, but using an online pool comes with many risks and limitations (e.g. lack of attention, lying about college status, only being able to imagine a hypothetical exam rather than take one), before we then moved into a single classroom. Additionally, as discussed earlier, this particular course was extremely unique for students, and thus results received may be quite unusual, and not representative of typical college courses.

While our studies took into account many applicable baseline measures of anxiety and beliefs about stress, future research would benefit from exploring additional measures. For example, the COPE inventory (Carver, Scheier, & Weintraub, 1989) may be an interesting metric in further understanding the strategies that students are using when it comes to stress. As we saw how much baseline beliefs mattered for performance in our studies, there is reason to believe that a greater understanding of students' baseline anxieties and stress strategies would help paint a clearer picture of student exam anxiety more generally. Additionally, future research should consider the possibility of using the word "stress" in place of "anxiety" when creating anxiety reappraisal messages. As anxiety has come to have a somewhat negative connotation, and to be thought of as something clinical, we believe that students may be more open to processing a reappraisal of the word "stress." As many undergraduates will openly admit that they are "stressed," fewer may identify themselves as "anxious" or suffering from "anxiety." As exam anxiety continues to plague students everywhere, more research is needed to gain a better understanding of this anxiety, and how educators can be positive influences on student anxiety.



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Table 1  
*Studies 1a and 1b: Baseline Measures of Anxiety*

Measures	Study 1a			Study 1b			Combined		
	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>
CTA average	2.22	0.74	89	2.25	0.77	278	2.47	0.72	367
WEQ emotionality	3.03	1.21	89	3.07	1.14	278	3.06	1.15	369
WEQ worry	2.86	1.08	89	2.91	1.02	278	2.90	1.04	369

Table 2

*Results of Chi-square Cross-Tabulation for Beliefs about Anxiety by Video Condition*

Video Condition	Beliefs About Anxiety	
	Anxiety Helps	Anxiety Hurts
Control	45 (24.3%)	140 (75.7%)
Intervention	88 (45.1%)	107 (54.9%)

*Note.*  $\chi^2(1, N = 380) = 18.06$ . Numbers in parentheses indicate row percentages.  
 $p < .001$

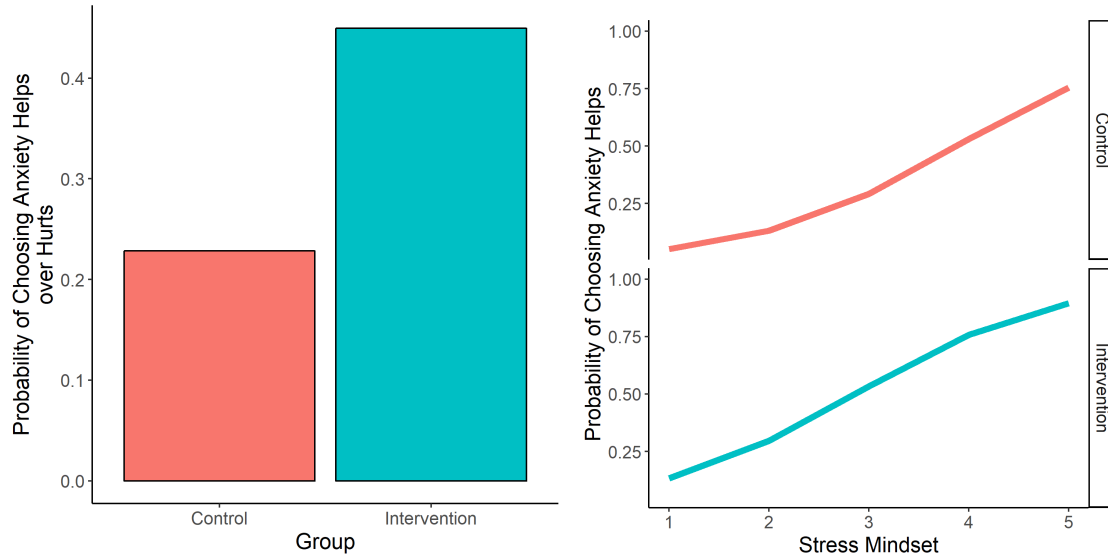


Table 4  
*Average Grades by Video Condition*

Measures	Exam 1		Exam 2		Final Exam		Final Grade	
	Average points	Average %	Average points	Average %	Average points	Average %	Average points	Average %
Control	75.02	37.51	75.46	37.73	228.25	57.06	614.36	76.80
Endorsement	76.21	38.11	69.18	34.59	233.86	58.47	582.56	72.82
Rejection	67.96	33.98	64.55	32.38	213.52	53.38	544.39	68.05

*Note.* Control N = 88. Endorsement N = 38. Rejection N = 45.





*Figure 1.* The reappraisal video corresponded with students' choice to endorse that anxiety helps, rather than hurts, performance (left). Stress mindset was associated with later beliefs about anxiety for participants in both conditions (right).

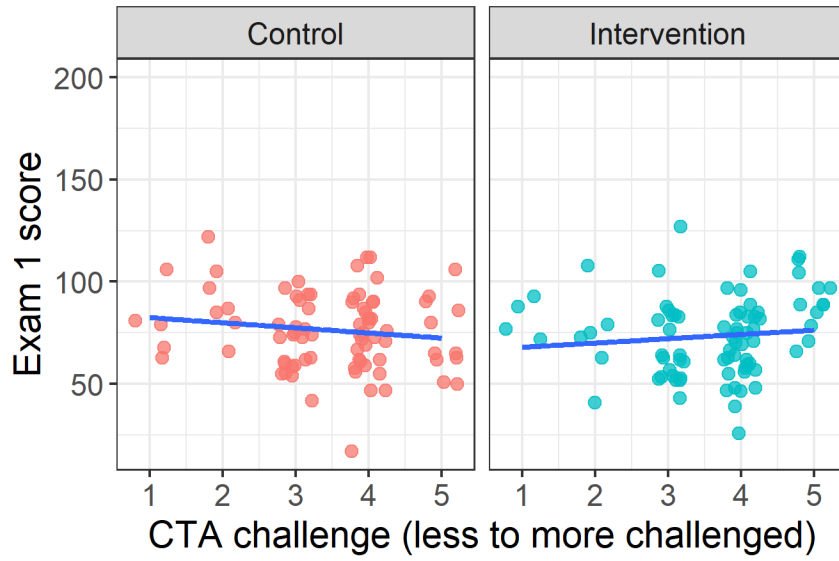


Figure 2. The effects of feeling challenged, instead of panicky, on Exam 1 performance by video condition.

Appendix A (1)  
Control Video Script

It is a truth universally acknowledged that tests can make a person feel anxious. When it comes to test time, people worry about different things. Like their mind going blank during the test, or having distracting thoughts, or being blindsided by an unexpected test question, or running out of time.

Even though Sarah knows she's not alone, she is beginning to get anxious about how she will perform when she gets to the test.

It may help Sarah to know that there are particular strategies that she can use to prepare.

Make a study schedule and stick to it. This will allow you to plan out your time and not end up having to cover as much information the day before the exam.

Pick a study environment free from distractions. Put away your phone and really concentrate on the material that you will be tested on.

Collaborate with classmates if it is helpful for you to talk the material out with others.

Remember to sleep instead of cram. Sleep will fuel your brain and allow you to think clearly once you receive your exam.

Make time to exercise and meditate, and don't forget to fuel your body with a lot of water.

And when it comes to the exam, read through the questions carefully and mark questions to come back to if you are unsure.

Follow your gut instinct when in doubt, and make sure to double check your work.

Before your next big exam, simply remind yourself that these study tips could help you do well!

Appendix A (2)  
Reappraisal Video Script

It is a truth universally acknowledged that tests can make a person feel anxious. When it comes to test time, people worry about different things. Like their mind going blank during the test, or having distracting thoughts, or being blindsided by an unexpected test question, or running out of time.

Regardless of why, it's pretty common to feel your heart speeding up, palms sweating, and mind racing during a test.

Even though she knows she's not alone, Sarah is still worried that her anxiety may hurt her performance on her big exam tomorrow – she wants to do her best.

It may help Sarah to know that her body is actually giving her the tools she needs to succeed as she prepares for this challenge. In fact, research has shown that when Sarah is faced with a challenge, her body increases in its physiological arousal.

When her heart rate and breathing pick up, blood is flowing to her brain and throughout her body spreading oxygen. Her body is releasing hormones and pumping adrenaline that helps direct her energy towards the task at hand. Together, all of these changes will enhance her ability to focus and help her retrieve relevant information from her memory when it comes to test time.

Once Sarah realizes that her feelings of anxiety can actually *help* her, she is able to channel her energy to make her perform her best.

Before your next big exam, simply remind yourself that your arousal could be helping you do well!

### Appendix A (3) Extended Reappraisal Video Script

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Once Sarah realizes that her feelings of anxiety can actually *help* her, she is able to channel her energy to make her perform her best.

This strategy doesn't just apply to tests. Physiological arousal can help prepare people for all sorts of challenges in life.

Before her big soccer game that advanced her team to the playoffs, Tracy used her anxious energy to propel her muscles into action and play with the skills she had been practicing. Taylor has been crushing hard on Alice but has been too nervous to approach her about it. Taylor's nerves before asking her out are a reminder that this is a really exciting opportunity, for both of them.

And when Zach fell into the pool, but didn't know how to swim, Will's physiological arousal allowed him to respond quickly and efficiently to help his friend.

Before your next big exam, or any other time you need to rise to a challenge, simply remind yourself that your arousal could be helping you do well!

Appendix B  
Worry-Emotionality Scale

*Questions were answered on a scale from 1 to 5 with 1 indicating “does not describe my feelings” and 5 indicating “clearly describes my feelings. 5 questions measure the worry component of anxiety (denoted with a W), and 5 questions measure the emotionality component (denoted with an E).*

1. I feel my heart beating fast. (E)
2. I am so tense that my stomach is upset. (E)
3. I am afraid that I should have studied more for this test. (W)
4. I have an uneasy, upset feeling. (E)
5. I am nervous. (E)
6. I feel regretful. (W)
7. I feel panicky. (E)
8. I feel that others will be disappointed in me. (W)
9. I feel I may not do as well on this test as I could. (W)
10. I do not feel very confident about my performance on this test. (W)

Appendix C  
Cognitive Test Anxiety Scale

*Questions were answered on a scale from 1 to 4 with 1 indicating “not at all typical of me” and 4 indicating “very typical of me.”*

1. During a course examination, I get so nervous that I forget facts I really know.
2. Finding unexpected questions on a test causes me to feel challenged rather than panicky.
3. I am a poor test taker in the sense that my performance on a test does not show how much I really know about a topic.
4. When I first get a copy of a test, it takes me a while to calm down to the point where I can begin to think straight.
5. When I take a test, my nervousness causes me to make careless errors.

Appendix D  
Stress Mindset Scale

*Questions were answered on a scale from 1 to 5 with 1 indicating “strongly agree” and 5 indicating “strongly disagree.” Measures 2, 4, 6, and 8 were reverse-coded before averaging.*

1. The effects of stress are negative and should be avoided.
2. Experiencing stress facilitates my learning and growth.
3. Experiencing stress depletes my health and vitality.
4. Experiencing stress enhances my performance and productivity.
5. Experiencing stress inhibits my learning and growth.
6. Experiencing stress improves my health and vitality.
7. Experiencing stress debilitates my performance and productivity.
8. The effects of stress are positive and should be utilized.



Appendix E  
Timed Evaluative Test Experience

*Participants were given 15 seconds to answer each multiple-choice question.*

1.  $45 + 36 =$   
a.) 71                      b.) 79                      c.) 81                      d.) 99
2.  $5x + 14 = 39$   
a.)  $x = 3$                       b.)  $x = 4$                       c.)  $x = 5$                       d.)  $x = 6$
3.  $72/6 =$   
a.) 11                      b.) 12                      c.) 13                      d.) 14
4.  $27 + 298 =$   
a.) 216                      b.) 314                      c.) 325                      d.) 345
5. If  $6 = 2x + 4y$ , what is  $x + 2y$ ?  
a.) 2                      b.) 3                      c.) 6                      d.) 8
6.  $3x + 2y = 15$ , where  $y = 3$ . What is  $x$ ?  
a.)  $x = 1$                       b.)  $x = 2$                       c.)  $x = 3$                       d.)  $x = 4$
7. A triangle has two angles that are 60 degrees. What is the third angle?  
a.) 30 degrees                      b.) 60 degrees                      c.) 90 degrees                      d.) 120 degrees
8.  $25 + 43 =$   
a.) 67                      b.) 58                      c.) 68                      d.) 87
9.  $8 + 6/2$   
a.) 7                      b.) 14                      c.) 11                      d.) 10
10.  $84 - 37 =$   
a.) 56                      b.) 57                      c.) 47                      d.) 48
11. Bandage : Blood :: \_\_\_\_\_ : \_\_\_\_\_

- a.) Cable : Bridge      b.) Cast : Injury      c.) Fort : Army      d.) Dam : River
12. Picture : Blurred :: Knife : \_\_\_\_\_  
 a.) Keen    b.) Painful    c.) Wealthy    d.) Blunt    e.) Shiny
13. Poke : Punch :: \_\_\_\_\_ : \_\_\_\_\_  
 a.) Murmur : Shout    b.) Crouch : Smack    c.) Lose : Win    d.) Groan : Hurt
14. Pleasure : Smile :: Pain : \_\_\_\_\_  
 a.) Aspirin    b.) Suffering    c.) Grimace    d.) Tranquility    e.) Joy
15. Grape : Raisin :: Plum : \_\_\_\_\_  
 a.) Blueberry    b.) Prune    c.) Fruit    d.) Purple
16. Potato chip : Salty :: Jalapeño : \_\_\_\_\_  
 a.) Sour    b.) Sweet    c.) Spicy    d.) Pepper
17. Grain of sand : Beach :: Blade of grass : \_\_\_\_\_  
 a.) Ground    b.) Lawn    c.) Weed    d.) Plant
18. Reinforce : Stronger :: \_\_\_\_\_ : \_\_\_\_\_  
 a.) Dismantle : Longer    b.) Wilt : Higher    c.) Shirk : Greater    d.) Erode : Weaker
19. Lawyer : Courtroom :: \_\_\_\_\_ : \_\_\_\_\_  
 a.) Participant : Team    b.) Commuter : Train    c.) Gladiator : Arena    d.) Patient : Ward
20. Apprentice : Plumber :: \_\_\_\_\_ : \_\_\_\_\_  
 a.) Player : Coach    b.) Child : Parent    c.) Author : Publisher    d.) Intern : Doctor

Appendix F  
*Post-Exam Reasons for Feeling Anxious*

*Please check the reasons, if any, that you felt anxious during the evaluation. You may choose as many or as few as you'd like:*

- The material covered on the evaluation is confusing
- I did not get enough sleep last night
- My body did not feel good (headache, stomach ache, etc.)
- I did not put enough time in to studying the material
- I felt less prepared than the other students in the class
- I studied but could not remember once I got to the evaluation
- I was distracted by other things in the classroom
- I began thinking about things unrelated to the evaluation

Appendix G  
Specific Measures Included in New Baseline Variables

WEQ Worry

*I am afraid that I should have studied more for this test. (3)*

*I feel regretful. (6)*

*I feel that others will be disappointed in me. (8)*

*I feel I may not do as well on this test as I could. (9)*

*I do not feel very confident about my performance on this test. (10)*

WEQ Emotionality

*I feel my heart beating fast. (1)*

*I am so tense that my stomach is upset. (2)*

*I have an uneasy, upset feeling. (4)*

*I am nervous. (5)*

*I feel panicky. (7)*

CTA Challenge

*Finding unexpected questions on a test causes me to feel challenged rather than panicky.*

CTA Anxious

*During a course examination, I get so nervous that I forget facts that I really know.*

*I am a poor test taker in the sense that my performance on a test does not show how much I really know about a topic.*

*When I first get a copy of a test, it takes me a while to calm down to the point where I can begin to think straight.*

*When I take a test, my nervousness causes me to make careless errors.*