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COGNITIVE DEFUSION AND PSYCHOLOGICAL FLEXIBILITY WITH SELF-
RELEVANT ACADEMIC DISTRESS STIMULI

A Dissertation
presented in partial fulfillment of requirements
for the degree of Doctor of Philosophy
in the Department of Psychology
The University of Mississippi

by

LAURA J. ELY

August 2011

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ABSTRACT

A distinctive feature of Acceptance and Commitment Therapy (ACT) is cognitive defusion. Rapid word repetition is one of the exercises used in ACT to promote defusion. Previous research has examined the effect of this exercise with the general population, using words representing negative self-referential thoughts. Studies have found that discomfort and believability of these thoughts decrease more following this defusion exercise as compared to a thought distraction task.

The present study evaluated the effects of the word repetition defusion exercise using content reflecting academic distress, in an undergraduate sample primed to feel academic anxiety. The defusion exercise was compared to a thought control task and a control condition (reading). The statement “I am a failure” was rated for discomfort, believability, and willingness pre- and post-intervention.

There was no statistically significant difference between the defusion and thought control interventions in changing any of the ratings. However, some statistically significant differences were found between the interventions and the control condition (reading an article). Defusion was superior to the control condition in decreasing discomfort ratings. Thought control was superior to the control condition in decreasing believability ratings. Willingness ratings decreased significantly in the thought control condition relative to the control condition.

The Implicit Relational Assessment Procedure (IRAP) was used as a behavioral measure to gauge any changes in psychological flexibility. The IRAP compared latency of correct

responses to tasks consistent and inconsistent with negative self-relevant thinking about academics. No statistically significant effect was found between conditions for the IRAP, indicating no difference in effect on psychological flexibility.

Differences in the outcome of this study and previous studies are discussed. Future studies should examine the word repetition and other cognitive defusion techniques in specific clinical populations. Future research should work toward refining measures of defusion.

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I. COGNITIVE DEFUSION AND PSYCHOLOGICAL FLEXIBILITY WITH SELF RELEVANT ACADEMIC DISTRESS STIMULI

Acceptance and Commitment Therapy

Acceptance and Commitment Therapy (ACT) is a mindfulness-based intervention, one of the contextualistic approaches that constitute the third generation of behavior therapy. ACT posits that problems in contextual control over cognitive processes can cause or worsen psychological dysfunction. These problems result in psychological inflexibility, where private events (e.g., thoughts, emotions, sensations) function to inhibit behaviors which would further an individual's chosen values and goals. ACT aims to create contexts in which behavior is more sensitive to environmental contingencies germane to values and goals and less sensitive to the form or frequency of private events. ACT does this through behavior change techniques and through mindfulness and acceptance techniques. (Hayes, Strosahl, & Wilson, 1999; Hayes, Luoma, Bond, Masuda, & Lillis, 2006)

Reviews of ACT outcomes support its efficacy and have shown nearly identical overall effect sizes (Hayes, et al., 2006; Ost, 2008; Powers, Zum Vorde Sive Vording, & Emmelkamp, 2009; Ruiz, 2010). The most recent meta-analysis of randomized controlled trials of ACT, with 18 studies in the analysis, found an effect size of 0.68 (Hedge's *g*) compared to wait list and psychological placebos, 0.42 compared with treatment as usual, and equivalent effects when compared with established treatments (e.g., cognitive behavior therapy, cognitive therapy,

systematic desensitization) (Powers, et al., 2009). However, a reanalysis of the data yielded a significant effect even compared to established treatments, with an effect size of 0.27 (Levin & Hayes, 2009). A recent broad review of all empirical evidence for ACT notes its efficacy and generally large effect sizes (Ruiz, 2010). All authors conclude that further studies are needed to fully determine any advantage of ACT over traditional treatments or vice versa, as ACT is still a relatively new intervention.

Need to Examine Mediators and Mechanisms of Change

Kazdin (2007) argues that a large problem in psychotherapy research is the lack of evidence that interventions work through their hypothesized mechanisms, despite years of empirical support of the symptom change produced by standard interventions. He illustrates the methodological problem of establishing a timeline of cause and effect between mediator and symptom change with examples from research on cognitive therapy. Though change in cognitive content has long been presumed as a mechanism in cognitive therapy, this is not supported empirically. Existing evidence actually suggests that cognitions are not a mediator or mechanism of cognitive therapy. (Kazdin, 2007)

A well-designed study sensitive to these methodological issues found that changes in negative cognitive content did not precede or predict changes in depressive symptoms (Jarrett, Vittengl, Doyle, & Clark, 2007). In a series of studies examining the components of cognitive behavioral therapy, no added benefit was found from cognitive interventions, leaving only behavioral activation components (Jacobson et al., 1996; Gortner, Gollan, Dobson, & Jacobson, 1998). In a study examining moderate and severe levels of depression, individuals showed poorer outcomes in a cognitive therapy condition compared to behavioral activation (Dimidjian

et al., 2006). Findings in these studies are not anomalies. Although cognitive behavioral interventions have an unquestionably substantial evidence for treatment outcome, confirmation of treatment processes has been elusive. Longmore and Worrell (2007), in a review of the literature on cognitive behavior therapy, found no substantial support for cognitive change as a mediator of treatment outcome. In addition, they noted that component studies have consistently shown no increase in efficacy due to cognitive interventions.

In light of years of training these interventions to thousands of clinicians, it would seem wise to explore mediators and mechanisms of action in ACT sooner rather than later. The development and application of the therapy could then evolve based on empirical findings. This can be accomplished from a bottom-up approach, without waiting for large dismantling studies, through methods such as testing individual components, processes, or even specific techniques (Hinton & Gaynor, 2010). Hayes (2008) emphasizes that attention to mediation has been part of the development of ACT since its inception. Kazdin likens the search for mediators, and ultimately mechanisms of change, to the strategy of chess, which is “won on multiple fronts,” through “an integrated series of actions, and converging moves” (2007, p. 11).

One method of progressing with this bottom-up approach is to investigate processes or components unique to ACT. Compared with traditional cognitive behavior therapy, one of ACT’s most distinguishing features is cognitive defusion. Defusion is the process that directly ties ACT to the behavior analysis of language in Relational Frame Theory (RFT; Hayes, Barnes-Holmes, & Roche, 2001). If ACT is to differentiate itself from other cognitive behavior therapies and to maintain theoretical coherence, then cognitive defusion should be closely examined.

Cognitive Defusion

ACT identifies fusion as a potentially problematic process resulting from normal human verbal learning. Fusion occurs when “certain verbal functions of events exert strong stimulus control over responding to the exclusion of other directly and indirectly available psychological functions” (Wilson & DuFrene, 2008, p. 54). Problematic fusion often involves aversive functions of language or thoughts. This causes difficulty when responding is very sensitive to those aversive functions that result in neglect or avoidance of valued activity. Other functions of thoughts might be available but are weaker. This is sometimes conceived as a restriction of probable responses to verbal stimuli, producing a narrow repertoire of responding. These narrow repertoires are of concern when they impede psychologically healthy behavior or induce psychologically destructive behavior. (Wilson & DuFrene, 2008; Wilson & Murrell, 2004)

Fusion often takes the form of responding to thoughts as if their content were literally true (Hayes et al., 2006). This can promote avoidance of desired activity or encourage undesired behaviors. Examples of fusion abound. An example relevant to the undergraduate sample in our study might be a thought like “I’m not smart enough for this class.” In fusion, this thought might function to inhibit studying, asking questions in class, going to class, or getting help from the professor. Someone with depression might have the thought “I don’t have enough energy to go out,” and respond to it by avoiding activity. Someone with trichotillomania might have the thought “I can’t stand this urge, I’ll pull just one more hair,” and respond to it by pulling out his or her hair.

Cognitive defusion is the process of lessening the strong, inflexible verbal stimulus control of fusion. Cognitive defusion techniques create contexts in which behavior becomes less sensitive to the content of thoughts, which have previously functioned to encourage avoidance

and inhibit valued action (Hayes et al., 2006; Blackledge, 2007). Sometimes this is described as changing how “one interacts with or relates to thoughts” (Hayes et al., 2006, p. 8). Defusion has also been described as broadening repertoires in response to thoughts (Wilson & DuFrene, 2008). In this sense, any exercise that involves new ways of experiencing or responding to thoughts enhances defusion.

Defusion techniques often attempt to disrupt what is referred to as the context of literality. This is the context of our verbal culture which functions to encourage an experience of thought content as literally true. Our verbal culture encourages responding to thoughts as if they are literally true in various ways. One way is the culture’s focus on thought content rather than on the process of thinking. Conventional speech patterns also help us to think literally about thoughts. Speaking at a consistent and culturally determined pace, for example, allows us to focus on the meaning of words rather than their sounds (Hayes et al., 2006; Blackledge, 2007).

Many defusion exercises focus attention on the process of thinking, on noticing thoughts as they occur. An example is observing thoughts in an eyes-closed exercise where the thoughts are visualized on leaves floating down a stream. Labeling thoughts as thoughts (e.g., I am having the thought that . . .) is another example. Defusion exercises that target conventional speech patterns include repeating thought content over and over at a rapid pace, until the sounds of the words become prominent and their literal meaning becomes less prominent. Manner of speech can also be altered in a defusion exercise. Thoughts might be sung or said in a silly voice, for example. While altering conventional speech patterns, these exercises also draw attention to the process of thinking over literal content of thoughts. (Blackledge, 2007)

Empirical Examinations of Defusion

Several studies have focused on defusion, including studies of defusion as a mediator of outcome in a full ACT treatment package, as the sole component in a brief treatment, and finally, examination of specific defusion techniques (Hesser, Westin, Hayes, & Anderson, 2009; Hinton & Gaynor, 2010; Healy et al., 2008; Masuda, Hayes, Sackett, & Twohig, 2004; Masuda et al., 2009; Masuda et al., 2010). Findings of these studies are briefly described below.

Hesser and colleagues (2009) examined participants' in-session defusion-consistent statements during an ACT treatment for tinnitus distress. An instance of a defusion-consistent statement was defined as "a verbal statement that included the client noticing, labeling and separating self from a private experience (e.g., a thought, feeling)" (p. 525). Along with frequency of defusion-consistent statements, raters gave each instance an "extensiveness" score, indicating the strength or depth of the statement. A "peak" level score was assigned for each session, being the highest "extensiveness" rating achieved during that session.

Results showed that frequency and peak level of defusion-consistent statements early in treatment predicted long term outcome. Further, because outcome measures were taken throughout the study, the experimenters were able to demonstrate that changes in defusion occurred before improvements in outcomes. The experimenters conclude that this is preliminary evidence for defusion as a mediator in ACT. (Hesser et al., 2009)

Cognitive defusion as the sole component of a brief treatment for distressed college students was compared to a waitlist control condition (Hinton & Gaynor, 2010). Participants were experiencing general psychological distress, as measured by scoring at least one SD above the mean on the Brief Symptom Inventory (BSI) and one SD below the mean on the Rosenberg Self-Esteem Scale (RSES). The treatment consisted of three weekly sessions, including a

defusion rationale and defusion techniques the experimenters refer to as *vocalizing strategies*. These strategies included repeating negative self-referential thoughts aloud rapidly, saying them slowly, saying them in a different voice, saying them like a radio announcer, and saying them like brief stories—with various qualities such as boring or outrageous.

Results showed statistically significant effects on all outcome measures (BSI, RSES, and the Beck Depression Inventory-II) in the cognitive defusion condition. Large effects sizes were found for self-esteem, general psychological distress, and depressive symptoms. Similar results were found for the waitlist participants once they received the defusion intervention.

The cognitive defusion condition produced a significant increase in psychological flexibility, as measured by the Acceptance and Action Questionnaire-II (AAQ-II). The experimenters also constructed a subscale of the Freiburg Mindfulness Inventory for use as a process measure of defusion for each session. They note that these scores suggested a gradual improvement in defusion over sessions. Outcome measures were not administered at each session, so a timeline that could establish whether defusion preceded or followed change in outcome was not produced. (Hinton & Gaynor, 2010)

Another study examined the effect of normal versus defused self-statements in a sample of undergraduate students (Healy, Barnes-Holmes, Barnes-Holmes, Keigh, Luciano, & Wilson, 2008). Negative self-statements were presented visually. The phrase “I am having the thought that” was used in conjunction with self-statements to promote cognitive defusion. Examples of normal and defused statements are “I am a bad person” and “I am having the thought that I am a bad person,” respectively. Ten different negative self-statements were used. The statements appeared on a computer screen for 6 seconds. Participants then rated discomfort, believability,

and willingness with regard to the statements (i.e., willingness to read and think about the statements).

Defused presentations elicited significantly lower discomfort ratings than normal presentations of the negative thoughts. Defused presentations also elicited significantly higher willingness ratings than normal presentations. Although higher ratings of believability were found for defused presentations, this was explained as possibly an artifact of the wording. It was hypothesized that participants were responding to whether or not it was believable that they were “having the thought that . . .” rather than believability of the content of the negative self-statement itself. The experimenters concluded that the results supported the use of cognitive defusion in increasing willingness to experience disturbing cognitive content and in reducing the discomfort of having the cognitive content. In an effort to examine demand characteristics, subjects were told that the exercise would either work, would not work, or would have no effect on the impact of the negative self statements. The impact of the defusion exercise was the same regardless of what subjects were told about the impact of the exercise. (Healy et al., 2008)

Three studies investigated the effect of a specific cognitive defusion exercise used in ACT that consists of rapidly repeating aloud a word or phrase, commonly known as the Milk-Milk-Milk exercise (Hayes, et al., 1999, p. 154). The first was a time-series study (Masuda et al., 2004). The repeated-word defusion exercise was alternated with a thought control task (deep breathing and positive thinking) and a control task (reading). Brief rationales were included for defusion and thought control conditions. Participants produced their own self-relevant negative thoughts and reduced them to one word (e.g. “I am too fat;” “fat”). This word was repeated aloud rapidly for 30 seconds during the exercise. Discomfort and believability of the thoughts were rated on two visual analog scales pre- and post-intervention. The cognitive defusion

exercise reduced ratings on both believability and discomfort of these negative thoughts as compared to the other conditions. This finding held across all eight participants.

The second study explored the effect of different durations of the same repeated-word exercise (Masuda et al., 2009). Participants again used one-word versions of their own self-relevant negative thoughts. Statistically significant reductions in ratings of discomfort and believability were found. The reductions were at their greatest after 3-10 seconds for discomfort and 20-30 seconds for believability. The experimenters note that this suggests that discomfort and believability are separate “functional aspects of cognitive events” (2009, p. 1).

The third study examined the same defusion exercise in a group design, comparing it with a thought distraction exercise (Masuda et al., 2010). The thought distraction exercise consisted of instructions to think of something else, prompted periodically by the experimenter with statements such as “don’t think about it.” Both conditions included rationales. As in previous studies, subjects generated their own self-relevant negative thoughts and reduced them to one word. Discomfort and believability of these thoughts were rated pre- and post-intervention. Defusion was found to reduce discomfort and believability ratings significantly more than thought distraction. However, the thought distraction exercise did reduce discomfort ratings significantly more than the control condition.

A subgroup with higher depressive symptoms was used for additional analyses. Participants were undergraduate students and those with scores on the Beck Depression Inventory-II at or above the mean of the sample were selected. For this subgroup, defusion was not superior to thought distraction in reducing discomfort, but it was superior to the control condition. There was also no statistically significant differential effect by condition on believability ratings.

Aims of the Present Study

The empirical studies described above suggest that word repetition, as a specific defusion technique, is effective in at least temporarily reducing discomfort and believability of self-relevant negative thoughts in the general population. It also appears that defusion could be superior to thought control interventions in reducing discomfort and believability. However, when a subsample with depressive symptoms was analyzed, this effect appeared less robust. Researchers have yet to examine this specific defusion technique in other populations, with distinct psychological difficulties, or with particular problematic thought content.

The present study evaluated the effects of the word repetition defusion exercise using content reflecting academic distress. Procedures were adapted from Masuda and colleagues (2004). A defusion exercise was compared to a thought control exercise. A distraction task (reading an article) was used as an experimental control condition. Participants were undergraduate students who were primed to think about academic failure. “I am a failure” was used as the thought content.

Based on previous research findings (Healy et al., 2008; Masuda et al., 2004; Masuda et al., 2009; Masuda et al., 2010), it was hypothesized that the cognitive defusion exercise would result in a greater decrease in discomfort, a greater decrease in believability, and a greater increase in willingness than the other conditions. In addition, a secondary hypothesis was that a purported behavioral measure of psychological flexibility, the Implicit Relational Assessment Procedure (IRAP), would indicate a greater increase in flexibility as a result of the defusion exercise compared to the other conditions.

II. METHOD

Pilot Study with IRAP Stimuli and Intervention Rationales

Participants. A separate sample of 104 undergraduate students was surveyed prior to the main study. Plausibility of experimental rationales (cognitive defusion and thought control) was evaluated. IRAP stimuli were also tested to ensure their desired function. These participants were recruited from the psychology department subject pool. There were 63 female and 41 male participants. Seventy-nine were Caucasian, 17 African-American, 4 Asian, 2 Hispanic, and 2 self-identified as “other.” The mean age of participants was 20 years old (range = 18-31).

Intervention Rationales. Participants were presented with the rationale of both the cognitive defusion and the thought control interventions as ways to cope with the thought “I am a failure.” Participants then filled out rating forms asking “How helpful will this exercise be to cope with the difficult thought?” They rated both interventions from 1 (not helpful at all) to 7 (extremely helpful). Thought control ($M = 5.17$) received significantly higher ratings than cognitive defusion ($M = 3.78$), $t(103) = -6.372, p = .000$. This indicates that participants believed thought control would be more helpful than cognitive defusion. Participants were also asked, “When you get these kinds of anxious thoughts about academics, which is closer to what you normally do?” (cognitive defusion or thought control). Seventy-five percent responded that thought control is closer to what they normally do. Participants were asked which intervention

they thought was a better idea and 74% responded that thought control was a better idea. These results suggest that cognitive defusion had no advantage over thought control based on rationale alone.

IRAP Stimuli. Potential stimuli for the IRAP included 39 positive and 49 negative words related to academic performance (e.g., wise, studious, stupid, feeble-minded). Participants were given the instruction “Take a moment and imagine that you are having your absolute worst day at school. Imagine that you are asked to think the following thoughts about yourself. Rate how uncomfortable it would be to think the thought by placing one mark on the line.” They were then presented with a list of sentences such as “I am stupid” and “I am intelligent.” They rated how uncomfortable the thoughts were on a visual analog scale, with Not At All Uncomfortable at 0 mm on the scale and Very Uncomfortable at 100 mm on the scale. The six negative stimuli with the highest ratings of discomfort (a disappointment, a failure, dumb, inadequate, useless, unsuccessful) and the six positive stimuli with the lowest ratings of discomfort (able, knowledgeable, capable, adequate, qualified, an achiever) were used in the IRAP task.

Main Study

Participants. Participants were 99 undergraduate students at the University of Mississippi, aged 18 years or older. They were recruited from the Psychology Department subject pool. There were 69 female and 28 male participants. Sixty-eight were Caucasian, 22 African-American, 6 Asian, 1 Hispanic, and 1 self-identified as “other.” The mean age of

participants was 20 years old (range = 18-44). Two participants failed to fill out demographic information.

Measures.

Demographics. Demographic information was collected as part of the IRAP computer task.

Psychological Flexibility: AAQ-II. The Acceptance and Action Questionnaire-II is a scale designed to measure psychological flexibility. Psychological flexibility is defined in ACT as “the process of contacting the present moment fully as a conscious human being and persisting or changing behavior in the service of chosen values” (Hayes et al., 2006, p. 9). The original 10-item version was used in this study, though more recent psychometric analysis has produced a 7-item version. Items are answered on a 7-point Likert scale. Higher scores indicate more psychological flexibility.

The AAQ-II has shown adequate psychometric properties (Bond, Hayes, Baer, Carpenter, Guenole, Orcutt, Waltz, & Zettle, in press). Test-retest reliability is reported as .81 at three months and .79 at twelve months. Internal consistency is reported as .84. The AAQ-II predicts outcomes consistent with theory, while also demonstrating discriminant validity.

General Psychological Distress: OQ-45. The Outcome Questionnaire-45 (OQ-45) was used to evaluate equivalence of groups with respect to general psychological distress. It is a 45-item questionnaire assessing psychological symptoms, interpersonal functioning, and social role functioning. Items are answered on a 5-point Likert scale. Higher scores indicate higher levels of distress, with scores ranging from 0 to 180. The OQ-45 has shown adequate reliability (test-

retest = .78-.84; internal consistency = .93) and validity in college age samples (Lambert, Hansen, Umpress, Lunnen, Okiishu, Burlingame, & Reisinger, 2001).

Academic Distress: LASSI Anxiety Scale. Attitudes and behaviors related to learning and studying are assessed in the 77-question Learning and Study Strategies Inventory (LASSI), which consists of ten scales. The 8-item Anxiety scale was used in this study to assess equivalence of groups with respect to academic distress. The scale consists of items such as: “I worry that I will flunk out of school,” which are rated on a 5-point Likert scale. Lower scores indicate poorer functioning (higher academic anxiety). The LASSI has been found to be reliable and valid for the evaluation of skills related to academic success in undergraduates (Weinstein, et al., 1988; Weinstein & Palmer, 2002).

Discomfort/Believability/Willingness Rating Forms. Instructions remind the participant of the thought being rated (“I’m a failure”). Participants rated each of the following by marking a point on a visual analog scale (0 mm – 100 mm): (1) Discomfort: “How uncomfortable is the thought?” (2) Believability: “How believable (true) is the thought?” (3) Willingness: “How willing are you to have this thought?”

Implicit Relational Assessment Procedure (IRAP). The Implicit Relational Assessment Procedure (IRAP) is a computer task which has been explored as a measure of implicit beliefs or attitudes, from an RFT perspective (Barnes-Holmes, Barnes-Holmes, Power, Hayden, Milne, & Stewart, 2006; Barnes-Holmes, Barnes-Holmes, Stewart, & Boles, 2010). The IRAP is somewhat similar in procedure to the more widely known Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998). In the IAT, it is assumed that participants respond more quickly and accurately when required to associate stimuli in ways consistent with their implicit attitudes.

The IRAP is based on a similar assumption. However, the IRAP allows examination of specific relationships between stimuli. Relational terms (e.g., similar/opposite, better/worse, true/false) can be used to test these specific relationships. (Barnes-Holmes et al., 2006; Barnes-Holmes et al., 2010)

Quicker responses in relating stimuli during the IRAP are held to indicate consistency with a participant's verbal learning history. The IRAP requires participants to "respond quickly and accurately in ways that are either consistent or inconsistent with their pre-experimentally established verbal relations" (Barnes-Holmes et al., 2006, p. 170). Mean response latencies are compared between "consistent" and "inconsistent" trials.

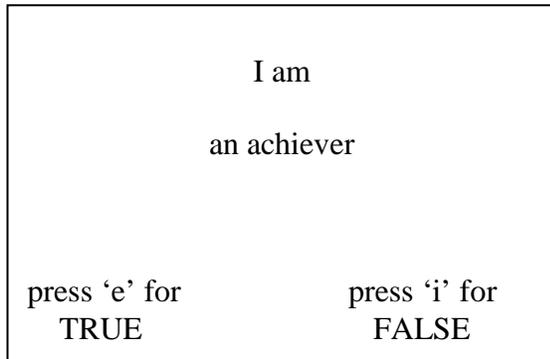
The "IRAP effect" of quicker responding in consistent trials has been found in previous studies, but the reliability and validity of the IRAP are not yet clear (Barnes-Holmes et al., 2006; Barnes-Holmes et al., 2010). How these trials are presented in the IRAP is also still evolving (Levin, Hayes, & Waltz, 2010).

For the purposes of this study, it was hypothesized that increased psychological flexibility due to the defusion exercise would reduce any "IRAP effect." In other words, responding to consistent and inconsistent trials would become more similar as psychological flexibility increased. Latency would decrease for inconsistent trials.

The IRAP for this study began by directing the participant to stimuli (words) that appeared in two boxes at the top of a computer screen. Participants were instructed to read the words together as a sentence (e.g., "I am capable"). Participants then responded to this sentence by picking between two choices at the bottom of the screen ("true" or "false").

For each trial, a category stimulus appeared at the top of the screen ("I am" or "I am not"), a target stimulus just below (a disappointment, a failure, dumb, inadequate, useless,

unsuccessful, able, knowledgeable, capable, adequate, qualified, or an achiever), and two relations at either side of the bottom of the screen from which the participant was to choose (“true” and “false”). Choices were made by pressing the “e” or “i” key on the keyboard (see example below).



Half of the trials were consistent with negative self-relevant thinking about academics. In other words, the correct response in a trial would be “true” in response to “I am a failure,” “false” in response to “I am an achiever,” and “true” in response to “I am not knowledgeable.” The other half of the trials were inconsistent with negative self-relevant thinking about academics. An incorrect selection produced a red “X” in the middle of the screen. The next trial did not appear until the correct selection was made.

After a series of practice trials to ensure that the participant understood the task, the experimental blocks began. Each block consisted of 24 trials. Three blocks of trials consistent with negative self-relevant academic thinking and three blocks of trials inconsistent with negative self-relevant academic thinking were randomly presented. The IRAP program recorded latencies of correct responses.

Procedure.

Pre-intervention. Participants completed the LASSI Anxiety scale and OQ-45.

Participants then completed the Academic Anxiety Mood Induction (see Appendix B) to focus their attention on thoughts of academic distress. The exercise consisted of sixty statements on separate sheets of paper that participants read at a pace of one per 15 seconds. The pace was kept by following recorded instructions to move to the next statement. Statements were adapted from Velten (1968) and were designed to begin with a neutral statement and subsequently increase in anxiety. Examples of statements include item 1: “Today is neither better nor worse than any other day,” item 30: “I feel so alone and scared about my academic future,” and item 60: “My life is so full of problems in school that make me worried that I can’t handle it. I feel like I’ll explode with tension.” After reading the statements, subjects were instructed to concentrate on their anxiety and feel it intensify while closing their eyes for 2 minutes. The subjects completed the IRAP. Discomfort/Believability/Willingness Rating Forms were completed immediately prior to the intervention.

Intervention. Participants signed up to do the study in groups of about fifteen in a classroom. Six sessions were held and the condition used in each session was randomly assigned, with two sessions for each condition. The experimenter presented each group of participants with one of the following interventions. They were scripted and lasted approximately the same amount of time (several minutes).

Defusion. The intervention began with a brief rationale for use of this technique with problematic thoughts. This was demonstrated with the “Milk, Milk, Milk” repeated-word exercise (Hayes et al., 1999, p. 154). Participants then practiced the repeated-word exercise with academic distress content (e.g., “I’m a failure”) for 60 seconds. (see Appendix A)

Thought Control. The intervention began with a brief rationale for use of this technique with problematic thoughts. Positive self-talk, breathing exercises, positive imagery, and thought-stopping were demonstrated briefly. The experimenter then reminded the participants of the academic distress content and instructed them to use these strategies to keep the thought away. The task was timed for 60 seconds. (see Appendix A)

No Instruction/Distracton. The experimenter instructed the participants to read an article on the ivory-billed woodpecker until she said, “stop.” The participants read the article for a time equivalent to the other conditions.

Post-Intervention. Discomfort/Believability/Willingness Rating Forms were completed immediately after the intervention. The participants then completed the IRAP a second time.

III. RESULTS

Equivalence of groups

A one-way ANOVA revealed no significant difference between groups in age, $F(2, 94) = .198$, $p = .821$. Chi-square tests also revealed no significant differences between groups in gender, $\chi^2(4, N = 99) = 1.457$, $p = .834$, or in race, $\chi^2(10, N = 99) = 8.783$, $p = .553$.

Descriptive statistics (mean, standard deviation, skew, kurtosis) were calculated for LASSI Anxiety, AAQ-II, and OQ-45 separately for each condition (see tables 1, 2, and 3). The skew and kurtosis were less than twice the standard error for each distribution, therefore adequate normality was assumed for use of ANOVAs. One-way ANOVAs revealed that there were no significant differences between conditions for the LASSI Anxiety scale scores, $F(2, 98) = 1.119$, $p = .331$, AAQ-II scores, $F(2, 98) = .977$, $p = .380$, or OQ-45 scores, $F(2, 98) = 1.487$, $p = .231$.

Table 1
Outcome Questionnaire-45 (OQ-45) Descriptive Statistics

Condition	N	Mean	SD	Skew	Kurtosis
Thought Control	32	54.56	18.130	.223	-.517
Defusion Exercise	36	62.58	18.998	.204	-.228
Read Article	31	60.16	21.298	-.164	-.073

Table 2
Acceptance and Action Questionnaire-II (AAQ-II) Descriptive Statistics

Condition	N	Mean	SD	Skew	Kurtosis
Thought Control	32	50.41	9.196	-.457	-.910
Defusion Exercise	36	47.92	9.840	-.293	-1.031
Read Article	31	47.00	11.121	-.317	.451

Table 3
LASSI Anxiety Scale Descriptive Statistics

Condition	N	Mean	SD	Skew	Kurtosis
Thought Control	32	20.00	4.551	-.530	-1.095
Defusion Exercise	36	18.61	4.265	-.494	-.775
Read Article	31	19.81	3.609	-.032	.638

Discomfort

An analysis of covariance was conducted to determine whether the post-intervention discomfort ratings for the thought control, defusion, and article conditions differed after adjustments for differences in pre-intervention discomfort ratings. Table 4 provides a descriptive summary of the pre- and post-intervention discomfort ratings, including the adjustments in the post-intervention discomfort means after controlling for the influence of the pre-intervention discomfort ratings. Visual analysis of unadjusted pre- and post-intervention mean discomfort ratings is available in figure 1.

Table 4
Discomfort Ratings Descriptive Statistics

Condition	N	Pre Mean	Post Mean	Adjusted Post Mean ^a	Adjusted Post Std. Error ^a
Thought Control	32	62.94	46.78	49.67	5.20
Defusion Exercise	35	70.20	45.49	43.40	4.97
Read Article	30	68.10	65.70	65.05	5.36

Note. Adjustments based on pre discomfort = 67.15

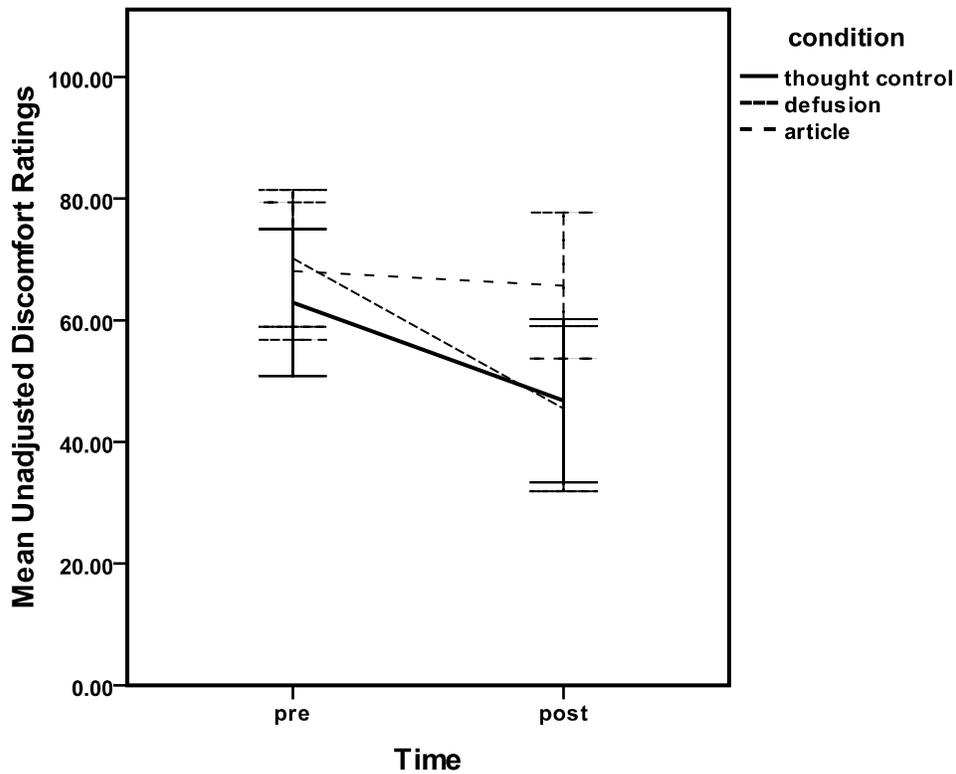


Figure 1 . Unadjusted mean discomfort ratings for each condition:

Thought Control, Cognitive Defusion, and Reading an Article. Error bars at 95% CI.

The assumption of homogeneity of variance was confirmed with the Levene test, $F(2, 94) = 2.480, p = .089$. A linear relationship between the pre- and post-intervention discomfort ratings for all groups was confirmed by graphic analysis of a scatterplot fitted with least squares regression lines (Figure 2). The assumption of equal regression slopes was supported by finding no significant interaction between the pre-intervention discomfort ratings and the intervention condition, $F(2, 91) = .477, p = .622$.

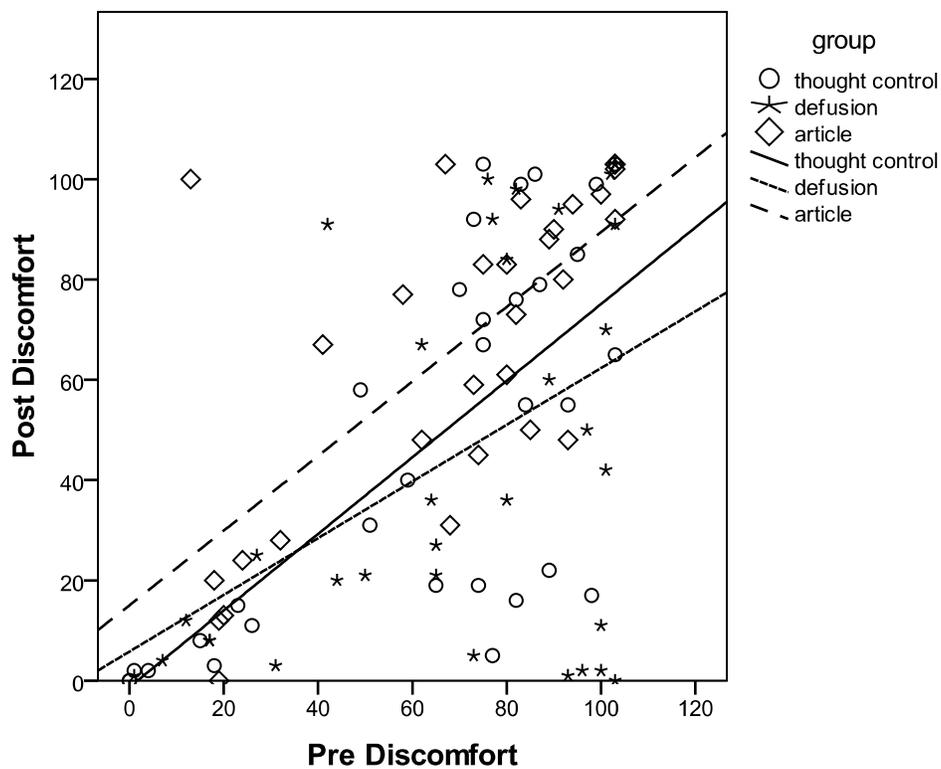


Figure 2. Pre- and post-intervention discomfort ratings: data points and regression lines per group.

As indicated in the discomfort ANCOVA summary (Table 5), pre-intervention ratings were significantly related to the post-intervention scores, $F(1, 93) = 53.25, p = .000$, partial $\eta^2 = .364$. After adjusting the group means for the pre-intervention discomfort ratings, intervention condition was found to have a significant effect on post-intervention discomfort ratings, $F(2, 93) = 4.57, p = .013$, partial $\eta^2 = .089$. Thus, the amount of decrease in discomfort ratings depended on the condition.

Bonferroni post-hoc comparisons revealed that the defusion intervention resulted in post discomfort ratings that were significantly lower than those in the article condition (mean difference = $-21.65, p = .012$). Thus the defusion intervention reduced discomfort ratings relative to the control condition. The difference between the post discomfort ratings in the thought control and article conditions was not significant (mean difference = $-15.38, p = .127$), nor was the difference between the defusion and the thought control conditions (mean difference = $-6.27, p = 1.00$).

Table 5
Discomfort Ratings ANCOVA Results

Source	SS	df	MS	F	Sig.	Partial η^2
Pre Discomfort	45845	1	45845	53.25	.000	.364
Condition	7870	2	3935	4.57	.013	.089
Error	80069	93	861			

Believability

An analysis of covariance was conducted to determine whether the post-intervention believability ratings for the thought control, defusion, and article conditions differed after

adjustments for differences in pre-intervention believability ratings. Table 6 provides a descriptive summary of the pre- and post-intervention believability ratings, including the adjustments in the post-intervention believability means after controlling for the influence of the pre-intervention believability ratings. Visual analysis of unadjusted pre- and post-intervention mean believability ratings is available in figure 3.

Table 6

Believability Ratings Descriptive Statistics

Condition	N	Pre Mean	Post Mean	Adjusted Post Mean ^a	Adjusted Post Std. Error ^a
Thought Control	32	26.63	14.31	16.13	3.42
Defusion Exercise	35	25.66	22.14	24.59	3.27
Read Article	30	36.77	33.43	28.63	3.56

Note. Adjustments based on pre believability = 29.41

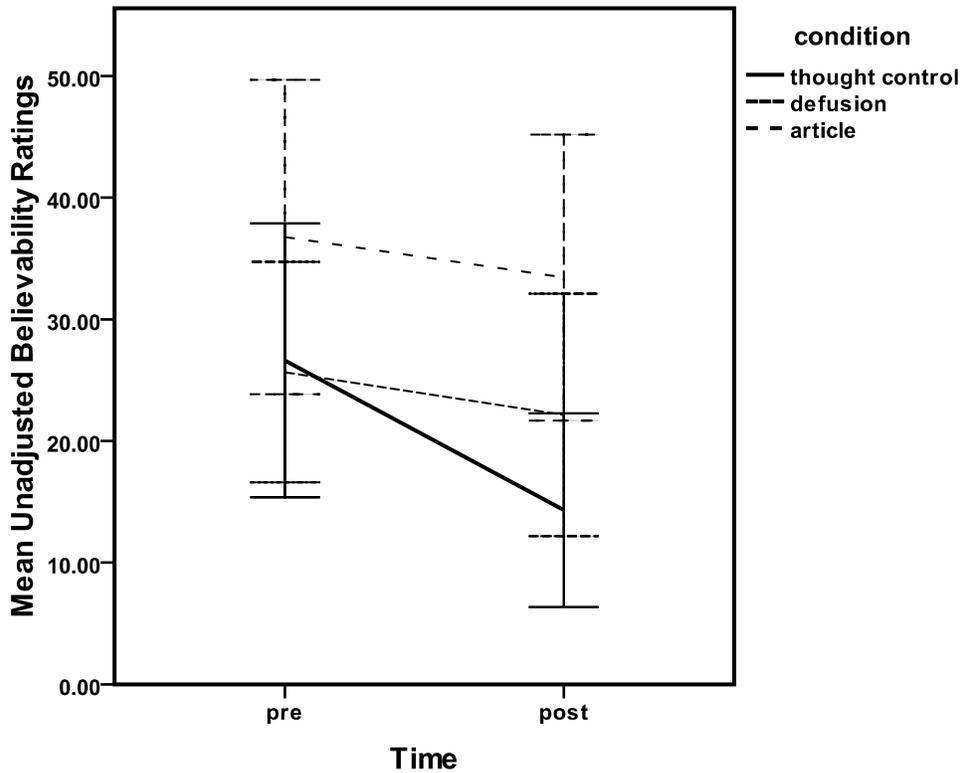


Figure 3 . Unadjusted mean believability ratings for each condition: Thought Control, Cognitive Defusion, and Reading an article. Error bars at 95% CI.

The assumption of homogeneity of variance was confirmed with the Levene test, $F(2, 94) = 1.33, p = .268$. A linear relationship between the pre- and post-intervention believability ratings for all groups was confirmed by graphic analysis of a scatterplot fitted with least squares regression lines (Figure 4). The assumption of equal regression slopes was supported by finding no significant interaction between the pre-intervention believability ratings and the intervention condition, $F(2, 91) = 1.99, p = .142$.

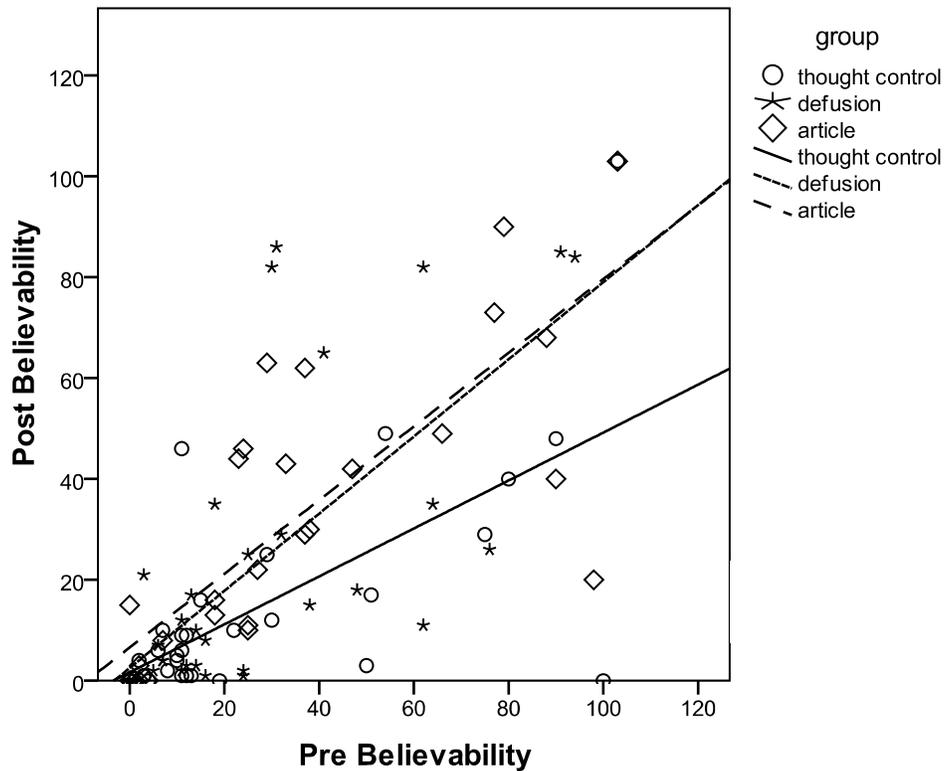


Figure 4. Pre- and post-intervention believability ratings: data points and regression lines per group.

As indicated in the believability ANCOVA summary (Table 7), pre-intervention ratings were significantly related to the post-intervention scores, $F(1, 93) = 101, p = .000$, partial $\eta^2 = .521$. After adjusting the group means for the pre-intervention believability ratings, intervention condition was found to have a significant effect on post-intervention believability ratings, $F(2, 93) = 3.37, p = .039$, partial $\eta^2 = .068$. Thus, the amount of decrease in believability ratings depended on the condition.

Bonferroni post-hoc comparisons revealed that the thought control intervention resulted in post believability ratings that were significantly lower than those in the article condition (mean

difference = -12.50, $p = .040$). Thus the thought control intervention reduced believability ratings significantly relative to the control condition. The difference between the post believability ratings in the defusion and article conditions was not significant (mean difference = -4.04, $p = 1.00$), nor was the difference between the thought control and the defusion conditions (mean difference = -8.46, $p = .23$).

Table 7
Believability Ratings ANCOVA Results

Source	SS	df	MS	F	Sig.	Partial η^2
Pre Believability	37776	1	37776	101	.000	.521
Condition	2520	2	1260	3.37	.039	.068
Error	34749	93	373			

Willingness

An analysis of covariance was conducted to determine whether the post-intervention willingness ratings for the thought control, defusion, and article conditions differed after adjustments for differences in pre-intervention willingness ratings. Table 8 provides a descriptive summary of the pre- and post-intervention willingness ratings, including the adjustments in the post-intervention willingness means after controlling for the influence of the pre-intervention willingness ratings. Visual analysis of unadjusted pre- and post-intervention mean willingness ratings is available in figure 5.

Table 8
Willingness Ratings Descriptive Statistics

Condition	N	Pre Mean	Post Mean	Adjusted Post Mean ^a	Adjusted Post Std. Error ^a
Thought Control	32	21.97	14.44	14.59	2.96
Defusion Exercise	35	23.29	20.89	20.23	2.83
Read Article	30	21.23	24.60	25.20	3.06

Note. Adjustments based on pre willingness = 22.22

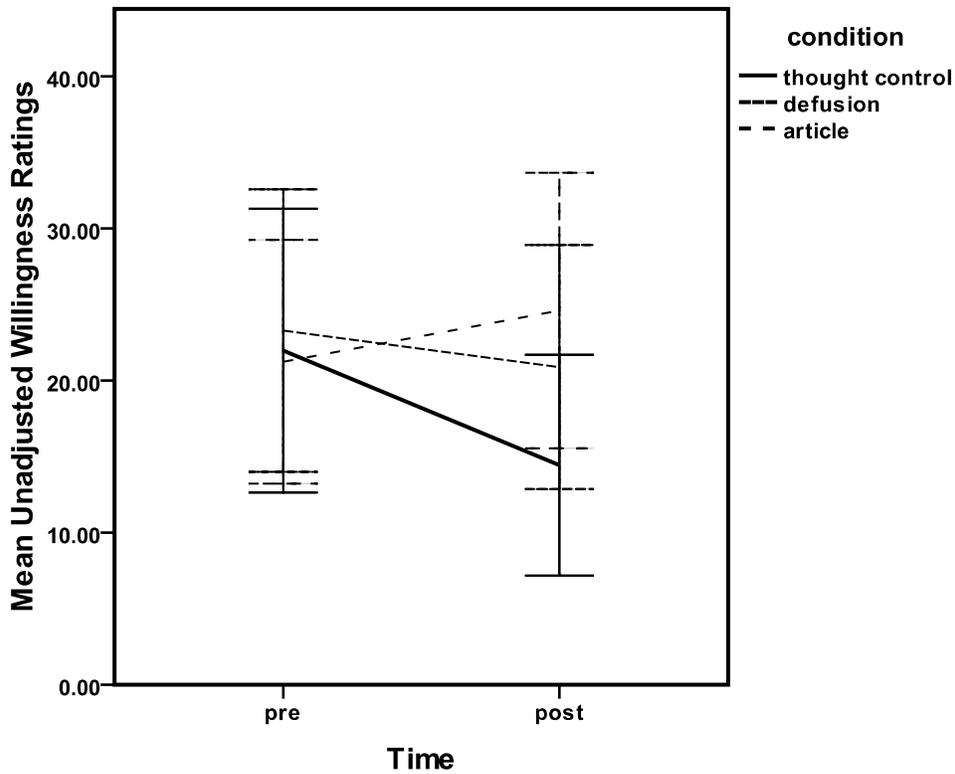


Figure 5. Unadjusted mean willingness ratings for each condition: Thought Control, Cognitive Defusion, and Reading an article. Error bars at 95% CI.

The assumption of homogeneity of variance was confirmed with the Levene test, $F(2, 94) = 2.31, p = .105$. A linear relationship between the pre- and post-intervention willingness ratings for all groups was confirmed by graphic analysis of a scatter plot fitted with least squares regression lines (Figure 6). The assumption of equal regression slopes was supported by finding no significant interaction between the pre-intervention willingness ratings and the intervention condition, $F(2, 91) = 1.91, p = .154$.

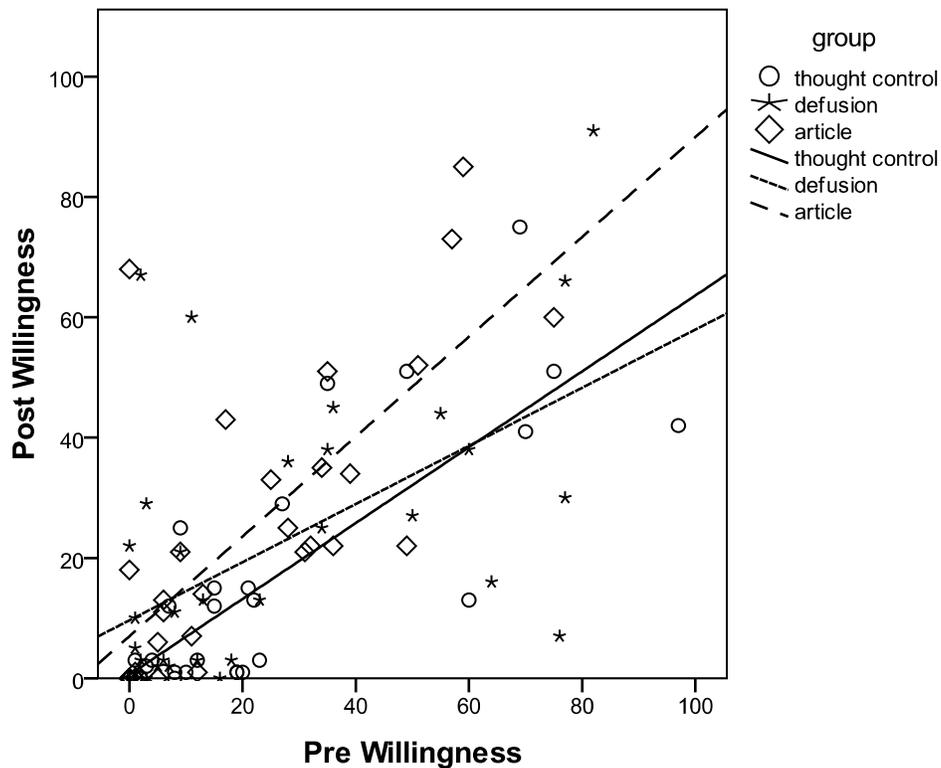


Figure 6. Pre- and post-intervention willingness ratings: data points and regression lines per group.

As indicated in the willingness ANCOVA summary (Table 9), pre-intervention ratings were significantly related to the post-intervention scores, $F(1, 93) = 79.22, p = .000$, partial $\eta^2 =$

.460. After adjusting the group means for the pre-intervention willingness ratings, intervention condition was found to have a significant effect on post-intervention willingness ratings, $F(2, 93) = 3.12, p = .049$, partial $\eta^2 = .063$. Thus, the amount of decrease in willingness ratings depended on the condition.

Bonferroni post-hoc comparisons revealed that the thought control intervention resulted in post willingness ratings that were significantly lower than those in the article condition (mean difference = -10.61, $p = .043$). Thus the thought control intervention reduced willingness ratings significantly relative to the control condition. The difference between the post willingness ratings in the defusion and article conditions was not significant (mean difference = -4.97, $p = .71$), nor was the difference between the thought control and the defusion conditions (mean difference = -5.64, $p = .52$).

Table 9
Willingness Ratings ANCOVA Results

Source	SS	df	MS	F	Sig.	Partial η^2
Pre Willingness	22194	1	22194	79.22	.000	.460
Condition	1749	2	875	3.12	.049	.063
Error	26056	93	280			

IRAP

Transformation to D_{IRAP} scores. The IRAP program records latency of correct responses in milliseconds. The raw latency data are most often transformed into D_{IRAP} scores for analysis. Data from individuals with unusually slow or fast responding are eliminated and

latency scores are divided by standard deviations. This is intended to reduce variance due to individual differences such as age and cognitive ability and allow for better group comparisons.

These transformations involve distinguishing four different trial types in the IRAP. Trial types in our IRAP are determined by the category stimulus (“I am” or “I am not”) and the type of target stimulus—a positive academic word or a negative academic word (“an achiever” or “a failure”). Trial types are “I am-positive,” “I am-negative,” “I am not-positive,” and “I am not-negative.” Either “true” or “false” is the correct response to each trial, determining whether the trial is consistent or inconsistent with negative self-relevant thinking about academics.

Steps for transformation from raw latency to D_{IRAP} scores are outlined by Barnes-Holmes and colleagues (2010, p. 533):

- (1) Only response-latency data from test blocks are used; (2) latencies above 10,000 ms from the data set are eliminated; (3) all data for a participant are removed if he or she produces more than 10% of test-block trials with latencies less than 300 ms; (4) 12 standard deviations for the four trial types are computed: four from the response latencies from Test Blocks 1 and 2, four from the latencies from Test Blocks 3 and 4, and a further four from Test Blocks 5 and 6; (5) 24 mean latencies for the four trial types in each test block are calculated; (6) difference scores are calculated for each of the four trial types for each pair of test blocks by subtracting the mean latency of the consistent block from the mean latency of the corresponding inconsistent block; (7) each difference score is divided by its corresponding standard deviation from step 4, yielding D_{IRAP} scores, one score for each trial type for each pair of test blocks; (8) four overall

trial-type D_{IRAP} scores, or IRAP effects, are calculated by averaging the scores for each trial type across the three pairs of test blocks.

These four trial-type D_{IRAP} scores were averaged for an overall D_{IRAP} score that was used in our analysis. Remember that ultimately, the D_{IRAP} score indicates the difference in latency in responding in ways that are consistent or inconsistent with negative self-relevant thinking about academics.

IRAP Analysis (ANCOVA). An analysis of covariance was conducted to determine whether the post-intervention D_{IRAP} scores for the thought control, defusion, and article conditions differed after adjustments for differences in pre-intervention D_{IRAP} scores. Two participants were eliminated from analysis as part of the D_{IRAP} algorithm, due to very short response latencies. A third was eliminated due to having a blank datasheet from the IRAP. Table 10 provides a descriptive summary of the pre- and post-intervention D_{IRAP} scores, including the adjustments in the post-intervention D_{IRAP} means after controlling for the influence of the pre-intervention D_{IRAP} scores.

Table 10
 D_{IRAP} Descriptive Statistics

Condition	N	Pre Mean	Post Mean	Adjusted Post Mean ^a	Adjusted Post Std. Error ^a
Thought Control	30	.319	.298	.287	.049
Defusion Exercise	35	.269	.262	.276	.045
Read Article	30	.309	.209	.203	.048

Note. Adjustments based on Pre $D_{IRAP} = .297$

The assumption of homogeneity of variance was confirmed with the Levene test, $F(2, 92) = .260, p = .772$. A linear relationship between the pre- and post-intervention D_{IRAP} scores for all groups was confirmed by graphic analysis of a scatterplot fitted with least squares regression lines (Figure 7). The assumption of equal regression slopes was supported by finding no significant interaction between the pre-intervention D_{IRAP} scores and the intervention condition, $F(2, 89) = .886, p = .416$.

As indicated in the IRAP ANCOVA summary (Table 11), pre-intervention scores were significantly related to the post-intervention scores, $F(1, 91) = 29.43, p = .000$, partial $\eta^2 = .244$. After adjusting the group means for the pre-intervention D_{IRAP} scores, intervention condition was found to have a non-significant effect on post-intervention D_{IRAP} scores, $F(2, 91) = .906, p = .408$, partial $\eta^2 = .020$. Thus the IRAP did not indicate an increase in psychological flexibility due to any intervention condition.

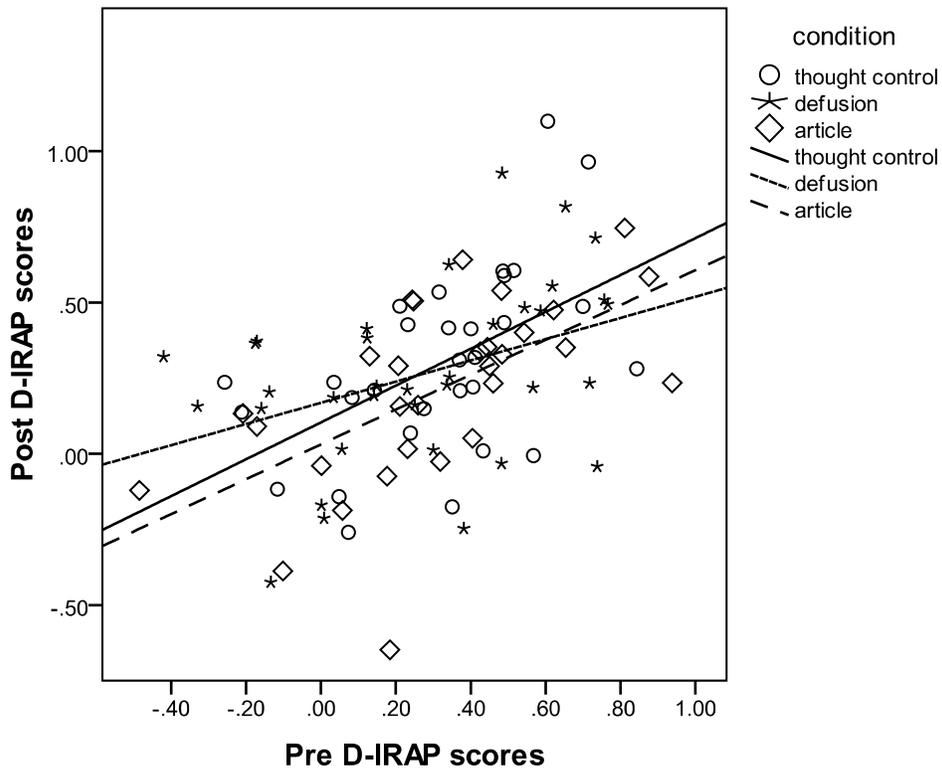


Figure 7. Pre- and post-intervention D_{IRAP} scores: data points and regression lines per group.

Table 11
 D_{IRAP} ANCOVA Results

Source	SS	df	MS	F	Sig.	Partial η^2
Pre D_{IRAP}	2.073	1	2.073	29.43	.000	
Condition	.128	2	.064	.906	.408	
Error	6.412	91	.070			

IV. DISCUSSION

The effect of a specific cognitive defusion exercise, with specific distressing thought content, was examined in the present study. A word repetition defusion intervention was compared with a thought control intervention. A distraction task (reading an article) was used as an experimental control condition. The thought content used in the exercises reflected academic distress. Participants were undergraduate students who were primed to feel anxious about academic failure. The statement “I am a failure” was rated for discomfort, believability, and willingness pre- and post-intervention.

No significant differences were found for post-intervention ratings (discomfort, believability, willingness) between the defusion and thought control interventions. The defusion exercise did result in significantly lower ratings of discomfort than the control condition. The thought control exercise did result in significantly lower ratings of believability than the control condition. Willingness ratings were expected to increase in the defusion condition, but they did not. Willingness ratings decreased significantly in the thought control condition relative to the distraction condition.

The IRAP was also administered pre- and post-intervention to assess any change in psychological flexibility. It was hoped that the IRAP would serve as a behavioral measure of defusion, to add to the self-report ratings of discomfort, believability, and willingness. The IRAP compared response latency to tasks consistent and inconsistent with negative self-relevant

thinking about academics. No significant effect was found between conditions for the IRAP, indicating no difference in effect on psychological flexibility.

The lack of difference on outcome measures following defusion and thought control conditions is unexpected given Masuda and colleagues' (2004, 2010) previous findings of defusion's superiority in similar comparisons. The protocol used in the interventions in this study was modeled after their initial investigation (Masuda et al., 2004), but there were some differences. These previous studies had participants produce their own negative self-referential statements and then reduce these to one word for use in the defusion exercise. This study, in contrast, used a short sentence (I am a failure) for every participant in the repeated-word defusion exercise. Masuda and colleagues' (2004) initial study comparing defusion to thought control was a small time-series study, where the interventions were administered individually. However, the more recent study (Masuda et al., 2010) was delivered in a group format just as the present study.

Willingness ratings were not taken in the studies discussed above, but were found to increase as a result of defused presentations of negative self-statements by Healy and colleagues (2008). This was a different defusion task than used in the present study, with 10 different negative self-statements presented visually. Those differences could account for this study's finding of word repetition's lack of effect on willingness ratings.

One limitation of this study, which was identified by Masuda and colleagues (2010) with a similar protocol, is that the thought control task was less structured during the 30 second intervention period than the defusion exercise. In the defusion exercise, participants were repeating thought content out loud throughout the 30 seconds. In the thought control task, participants were instructed not to think of the thought content and were only reminded of this

once in the 30 second period. How exactly participants were responding to their own thoughts during this time was likely to have been more varied than in the defusion condition.

Masuda and colleagues (2010) also point out that the differences in process between defusion exercises and thought control/distraction exercises have not yet been clearly delineated. It is possible that similar processes are occurring in both interventions. Masuda and colleagues' (2010) study found that thought distraction had significant effects compared to the control condition.

Masuda and colleagues (2010) suggest that the believability measure might not have been sensitive enough to detect some changes due to defusion in their study. They suggest that instead of "how believable (true) is the thought?" better alternatives could be "how much do you experience the thought simply as a mental event, rather than as an absolute fact about you?" or "how OK is it for you to have this thought?" They suggest that these questions might better detect changes due to the process of defusion. This could also be the case in the present study.

Masuda and colleagues (2010) noted their reliance on self-report measures alone as a limitation of their study. The present study attempted to address this with the inclusion of the IRAP. However, the IRAP has its own limitations, yet lacking evidence of reliability or validity. It is not clear if the IRAP would have measured any potential changes due to the defusion exercise. Methods to directly assess defusion processes would further research in this area. Unfortunately such methods have yet to be developed.

It is possible that the present study did not find the expected effect of defusion due to the characteristics of the population. Participants were undergraduate students, and though they were exposed to a procedure intended to induce academic anxiety, it could be that academic concerns were not particularly relevant for a portion of the sample. The phrase "I am a failure,"

following the academic anxiety induction exercise, might not have been very meaningful for some of the participants. A sample of individuals on academic probation could be used in future studies to address this concern. Or participants could be screened for academic distress prior to inclusion. It is also possible that the word repetition defusion exercise is an effective technique, but not in every population or with every psychological difficulty.

Future studies could vary the dose and timing of the intervention, perhaps exposing participants to the intervention at several time points. This would be more similar to the way that defusion exercises are used in clinical situations. In treatment, exercises are often repeated or several defusion exercises are used within a therapy session, with treatment spread over weeks.

Future studies should address these limitations and examine the repeated-word defusion technique, as well as other defusion exercises, in other contexts. These techniques would ultimately be used as part of clinical interventions, so it would make sense to focus studies on samples with specific clinical difficulties. Improvement in measuring the process of defusion would aid tremendously in research investigating defusion as a mediator or mechanism in ACT. Careful examination of components of ACT as a treatment should help in its development as an empirically based intervention. Defusion as a process in ACT cannot be assumed to be an active ingredient without ongoing empirical investigation.

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Appendix A: Protocol

ACT Defusion

Experimenter (E): As a species, language, including thoughts and words, gives us the blessings and the curse of knowledge. The power of language has pros and cons: there is a "light side" and a "dark side". On the positive side, we can influence the environment and create a comfortable life. Just look around in this room. Lights, chairs, central heating, and clothes we are wearing... Without language and our thoughts (e.g., logical thinking), these would not be here. On the dark side, however, we are the only species that worries. In the extreme case, we are the only species that commits suicide.

The dark side becomes dominant when we believe that our thoughts are literally what they say they are, especially thoughts about ourselves that could be evaluative and judgmental. For example, "I am no good." And we tend to think of our thoughts, of what they say, as the reality or as the criteria of the reality. For example, you are what your thoughts say who you are, what you are, and how you are. However, are you really what your thoughts say you are?

What if I say that thoughts are simply what they are (thoughts are just thoughts), rather than what they say they are. OR you are not what they say you are. It might be difficult to get this point, so let's do a little exercise.

As I say, this exercise sounds silly. I'm going to ask you to say a word. Then you tell me what comes to mind. I want you to say the word, "Milk".

Participant (P): Milk.

E: Good. Now tell me what comes to mind when you said it?

P: (I have milk at home in the refrigerator).

E: O.K. what else? What shows up when we say "Milk".

P: (I picture it---white, a glass).

E: Good what else? (Can you taste it?). Can you feel what it feels like to drink a glass of milk? Cold, creamy, coats your mouth...right?

E: O.K. let's see if this fits. What came across your mind were things about actual milk and your experience with it. All that happened is that we made a strange sound — Milk (say it slowly!) --- and lots of those things show up. Notice that there isn't any milk in this room, not at all. But milk was in the room psychologically. You and I were seeing it, tasting it, and feeling it. And yet, only the word was actually here.

E: Now, here is another exercise. The exercise is a little silly, and you might feel embarrassed doing it, but I am going to do it with you so we can all be silly together. What I am going to ask you to do is to say the word, "milk," out loud, over-and-over again, and as rapidly as possible, and then notice what happens. Are you ready?

E: O.K., Let's do it. Say "milk" over and over again!
(20 seconds).

E: O.K. now stop. Tell me what came to mind while you kept repeating it?

P: (e.g., Gone, it sounds funny, it was just a sound)

E: Did you notice what happened to the psychological aspects of milk that were here a few minutes ago?

P:

E: Right, a creamy, cold, gluggy stuff just goes away. When you said it the first time, it was as if milk was actually here, in the room. But all that really happened was that you just said that word. The first time you said it, it was "psychologically" meaning-full, and it was almost solid. But when you said it again and again and again, you began to lose that meaning and the words became just a sound.

E: What I am suggesting is that... What happens in this exercise may be applied to our personal thoughts about ourselves. When you say things to yourself in addition to any meaning behind those words, isn't it also true that these thoughts are just thoughts. The thoughts are just smoke, there isn't anything solid in them.

E: Now, your task here is to say the thought "XXX ," out loud, over and over again, as rapidly as possible until I say "stop". Do you have any questions?

P: (the participant may or may not ask questions about the procedure)

E: O. K., are you ready? Now, begin (Experimenter may repeat the thought with the participants initially to prompt them to follow the protocol).

(60 seconds)

E: Stop!

Thought Control

Experimenter (E): It is often conceptualized that the core of our emotional and psychological suffering is caused by our negative thoughts, such as negative thoughts about the situation, oneself, and the future. From this perspective, these thoughts are considered to affect our subsequent actions.

This notion has been supported culturally in our society. We can see this attribution of cause in our daily lives. For example, "I cannot ask her out, because (I think) I'm not attractive enough." "(I think) I am stupid and that thought makes me feel miserable." We have a tendency to believe that our thoughts are the reason or cause of our actions.

One way to prevent this pattern is to remove or control your negative thoughts. Controlling them by distracting yourself, thinking something different, or suppressing them, trying to get rid of them.

When you think something negative, You will tell yourself, "Stop! Stop thinking about it." What are your strategies to deal with your negative thoughts when they appear in mind?

Participant (P):

E: O.K., Good. What else?

P:

E: O.K., so now let's review what psychotherapy literatures say about controlling thoughts and feelings. In psychotherapy, there are several techniques to control your thoughts and feelings so that you don't have to feel as much discomfort. These are 1) positive self-talk, 2) breathing training, and 3) positive imagery. In positive self-talk, you say something positive to yourself whenever you have a negative thought. Can you tell me some positive thoughts?

P:

E: Good, now for breathing training, I want you to put your hand on your stomach, and do as I say. I want you to breath slowly, inhaling the air from your nose, and hold it for a while, and exhale it from the mouth slowly.

E: Positive imagery is similar to positive self-talk, you simply visualize something positive in your mind, such as a beautiful beach, calm lake, and so on. All of these techniques are designed to remove your uncomfortable thoughts.

E: Now let's do a little exercise. I want you to say "XXX." Say it once now.

Participant (P): XXX

E: O.K. Your task is to NOT think of the words, "XXX". You must try hard not to think "XXX" until I say, "STOP". If you have any questions, please ask me now.

P: (the participant may or may not ask questions about the procedure)

E: Are you ready? Now, begin (The experimenter will say "Don't think of XXX " once in the 30th second of the session).

(60 seconds)

E: Stop!

No Instruction Condition (reading an article)

Experimenter (E): Please read this article until I say "Stop". If you have questions, please ask me now.

(5 minutes)

Experimenter (E): O.K., Stop. Remember the thought "XXX." I would like you say it once.

Participant (P): XXX

Appendix B: Measures

PRE: Discomfort, Believability, & Willingness Rating Form

“I am a failure.”

1). How uncomfortable is the thought? Please mark (√) on the dashed line.

|-----|

Not at all Uncomfortable

Very Uncomfortable

2). How believable (true) is the thought?

|-----|

Not at all Believable

Very Believable

3). How willing are you to have this thought?

|-----|

Not at all Willing

Very Willing

POST: Discomfort, Believability, & Willingness Rating Form

“I am a failure.”

1). How uncomfortable is the thought? Please mark (√) on the dashed line.

|-----|

Not at all Uncomfortable

Very Uncomfortable

2). How believable (true) is the thought?

|-----|

Not at all Believable

Very Believable

3). How willing are you to have this thought?

|-----|

Not at all Willing

Very Willing

LASSI Anxiety Scale (all items except #5 are reverse scored; higher score = less anxiety)

Rate how much the statement is typical of you:

1. I worry that I will flunk out of school.

1-----2-----3-----4-----5
not at all not very somewhat fairly very much

2. I get discouraged because of low grades.

1-----2-----3-----4-----5
not at all not very somewhat fairly very much

3. I am very tense when I study.

1-----2-----3-----4-----5
not at all not very somewhat fairly very much

4. Even when I am well prepared for a test, I feel very anxious.

1-----2-----3-----4-----5
not at all not very somewhat fairly very much

5. When I begin an examination, I feel pretty confident that I will do well.

1-----2-----3-----4-----5
not at all not very somewhat fairly very much

6. Worrying about doing poorly interferes with my concentration on tests.

1-----2-----3-----4-----5
not at all not very somewhat fairly very much

7. I feel very panicky when I take an important test.

1-----2-----3-----4-----5
not at all not very somewhat fairly very much

8. I get so nervous and confused when taking an examination that I fail to answer questions to the best of my ability.

1-----2-----3-----4-----5
not at all not very somewhat fairly very much

AAQ-2

Below you will find a list of statements. Please rate how true each statement is for you by circling a number next to it. Use the scale below to make your choice.

1	2	3	4	5	6	7
never true	very seldom true	seldom true	sometimes true	frequently true	almost always true	always true

1.	Its OK if I remember something unpleasant.	1	2	3	4	5	6	7
2.	My painful experiences and memories make it difficult for me to live a life that I would value. (Reverse)	1	2	3	4	5	6	7
3.	I'm afraid of my feelings. (Reverse)	1	2	3	4	5	6	7
4.	I worry about not being able to control my worries and feelings. (Reverse)	1	2	3	4	5	6	7
5.	My painful memories prevent me from having a fulfilling life. (Reverse)	1	2	3	4	5	6	7
6.	I am in control of my life.	1	2	3	4	5	6	7
7.	Emotions cause problems in my life. (Reverse)	1	2	3	4	5	6	7
8.	It seems like most people are handling their lives better than I am. (Reverse)	1	2	3	4	5	6	7
9.	Worries get in the way of my success. (Reverse)	1	2	3	4	5	6	7
10.	My thoughts and feelings do not get in the way of how I want to live my life.	1	2	3	4	5	6	7

Demographic Information

Age (in years): _____

For the remaining items, please circle your answers—circle only one answer per question.

Country of Origin (where you have lived the majority of your life):

¹United States ²Other

Education (choose your current level of education):

¹freshman ²sophomore ³junior ⁴senior ⁵graduate

Political Affiliation (select the party that you most identify with):

¹Democrat ²Republican ³Other

Race (select the ethnicity that you most identify with):

¹African-American ²Asian ³Caucasian ⁴Hispanic ⁵Other

Religion (select the category that you most identify with):

¹Agnostic ²Atheist ³Buddhist ⁴Christian ⁵Hindu ⁶Jewish ⁷Muslim ⁸Other

Sex:

¹Female ²Male

Socioeconomic Status (if someone other than you is providing more than 50% of your income, please report his or her annual income instead):

¹\$10,000 or less ²\$10,001-\$20,000 ³\$20,001-\$40,000 ⁴\$40,001-\$60,000
⁵\$60,000 or more

Academic Anxiety Mood Induction

Oral instructions:

“You will read self referent, mood related statements at the rate of one per 15 seconds. Concentrate on the mood associated with each statement and think of things in your own life that reflects the mood represented by each statement. After you have read 60 statements, you will read a set of incubation instructions designed to build the mood even more. After that, you will sit for 2 minutes while concentrating on building the mood. If the task becomes too uncomfortable, raise your hand, and the experimenter will excuse you from the task.”

Academic Anxiety Statements

1. Today is neither better nor worse than any other day.
2. I'm an incredibly anxious person when it comes to academics.
3. I'm haunted with thoughts about myself and how I come across to others in classes.
4. I feel distressed by thoughts about college that disturb me.
5. I'm worried that the potential for failing may get a lot worse.
6. School makes me fret with concern in general.
7. I feel needled and badgered with racing thoughts about grades.
8. It takes too much effort to try to relax—I feel too agitated to study.
9. I think about the same aggravating worries about school day after day.
10. I'm afraid that the potential for me to fail may get a lot worse. I'm afraid for my future.
11. I'm edgy and very worried about grades.
12. My mind is troubled and harried by all the schoolwork I have to do.
13. I feel incredibly vexed and concerned about academics today.
14. I wish I could stop thinking about things like failing that make my blood run cold.
15. My mind is sometimes racing about school—I couldn't relax if I wanted to.
16. I can't communicate because I'm too confused in my mind about my academic future.
17. I'm plagued by my racing mind, with thoughts about college.
18. There have been days when I felt unnerved and anxious and unable to do any schoolwork.
19. It seems like my body may start to shake and tremble during tests.
20. I feel like I'm on pins and needles thinking about school.
21. Even when I try to relax—I'm always worried about school.
22. I feel hounded by my own thoughts about school.
23. I have too many concerns about my classes—I don't know what to do.
24. I'm so tense that I'm having trouble remembering things for tests.
25. It's so frightening, how tense I feel when I try to study.
26. I have the feeling that I will never calm down enough to succeed in college.
27. My mind is racing with all the concerns and problems about school that make me anxious.

28. I've lain awake at night worrying about never succeeding in school.
29. There have been days that I have worried so much about failing that I seemed to do little else.
30. I feel so alone and scared about my academic future.
31. I'm much more anxious about grades than when I was younger—I seem to be getting worse.
32. Too often I have found myself filled with a sense of dread, thinking worrisome thoughts when I definitely should have been studying.
33. My mind is troubled and full of dread about my future.
34. I'm beginning to feel so uptight that I'm getting more and more worried thoughts about school.
35. I'm horribly concerned about my family knowing how much I'm struggling in college.
36. All of my academic fears and nightmares seem to be taking possession of me.
37. It has occurred to me more than once that studying is basically useless because I feel too restless and agitated to concentrate.
38. I'm an incredibly uptight person when it comes to schoolwork.
39. I'm terribly tense and annoyed by my thoughts—I can't study.
40. I'm so worried that I can't concentrate on anything.
41. I worry so much about failing that I can't stand it.
42. I'm getting nervous and anxious about my studies, I can feel the muscles in my body getting more and more tense.
43. I'm too scared—I don't know what to do about school.
44. When I feel this anxious about school, I fear that I may have a heart attack. My health may not be as good as it's supposed to be.
45. Every now and then I feel so worried that I can't sit still or get any school work accomplished.
46. I can't think of anything except my worries about failing.
47. I couldn't relax or calm down now if I had to.
48. At times I've been so fearful and scared that I ran away from academic problems rather than face them.
49. No matter how hard I try, I can't stop this feeling of panic and doom about my future.
50. I've lain awake nights unable to sleep because I'm so terrified about school.
51. It feels like I may start trembling like a leaf—I'm unable to work on the things I know I must get done.
52. I can't stop worrying—my whole life makes me feel like I'm going to burst.
53. I'm so scared about my future that I feel like my hair is standing on end.
54. Sometimes I feel like I might have a panic attack.
55. I'm so afraid—my academic struggles make me feel tense and worried. I feel like I have no control.
56. A sense of foreboding and dread fills me with fear that I will fail.
57. At times I've been so worried that I've had trouble sleeping and facing going to class.
58. My life is so full of things to do for classes that fill me with dread that I can't stand it.

59. I feel paralyzed with fear—some very important decisions about my future are almost impossible to make.
60. My life is so full of problems in school that make me worried that I can't handle it. I feel like I'll explode with tension.

Incubation Instructions

Now that you're feeling very anxious about school, concentrate on this feeling. Feel it getting stronger and stronger; more and more worried. Let it continue to build. Think about things that have happened in your academic life that have made you feel very, very anxious; like an upcoming exam, or telling your parents that you are doing poorly, or like being frightened about your future. Concentrate on it. Let yourself feel very jittery, worried, very anxious, very terrified. As you do, you'll feel the mood build. It'll become more intense, more anxious. This in turn will make you think of other things about college that have made you feel very, very anxious. The mood will continue to build. Feel it become more intense. Feel it get stronger and stronger. It will happen. Do and think whatever you can to build this very anxious mood. Feel very, very anxious about your academic future. Close your eyes. Begin now. (2 minutes)

VITA

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