

# The Effect of Emotion Regulation Strategies on Physiological and Self-report Measures of Anxiety During a Stress-inducing Academic Task

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## ABSTRACT

Recent research suggests that psychological acceptance and mindfulness are useful strategies for dealing with anxiety. Some studies have shown that the benefits are found mainly with subjective and not physiological measures of anxiety -and vice versa. We investigated differences in skin conductance level as a proxy of anxiety in 80 participants at three time-points: at baseline and then during a stress-inducing task presented both before and after exposure to an emotional regulation strategy. Self-report measures of relaxation and anxiety were also recorded. Participants were exposed to one of four strategies (Acceptance, Mindfulness, Suppression and Endurance) or a control condition. Participants in the Acceptance strategy showed a slight decrease in arousal from pre- to post-intervention, while all other groups showed an increase. Post-hoc analysis revealed a statistically-significant difference between the Acceptance and Control conditions. All conditions showed an increase in self-reported anxiety. The results indicate that Acceptance might be useful strategy for reducing physiological symptoms of anxiety. The limitations of this study are indicated and the need for further studies emphasized.

*Key words:* psychological acceptance, thought suppression, mindfulness, anxiety, skin conductance, task anxiety.

### Novelty and Significance

#### *What is already known about the topic?*

Acceptance has been found to be more effective than suppression and placebo in reducing subjective and physiological measures of arousal.

Mindfulness interventions have been found to be effective at reducing self-reported anxiety.

#### *What this paper adds?*

This paper is among the first to include an endurance intervention to compare with acceptance and mindfulness.

This paper is one of few to examine potential differences between acceptance and mindfulness.

This paper includes both physiological and self-report measures of arousal.

Anxiety commonly involves an increased level of focus on internal private events (thoughts and physical sensations) that appears to differentiate clinically anxious from non-anxious individuals (Panayiotou & Vrana, 2004). For non-anxious individuals, this focus can be beneficial in providing a perception of one's ability to meet goals. In

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contrast, for anxiety sufferers, focus on private events is often associated with a perceived inability to meet expected outcomes (Forman & Herbert, 2007; Mor & Winquist, 2002). Metacognition (an individual's response to thoughts and other private events) also differentiates these two groups. That is, a non-anxious individual may evaluate physiological events, such as increased heart rate, as the logical outcome of engaging in difficult activity. Conversely, an anxious individual may evaluate these events as confirmation of a state of physiological anxiety (Carver, 1979; Spada, Georgiou, & Wells, 2010).

Thought suppression strategies have been employed in therapeutic attempts to limit excessive self-focus observed with anxious clients (Short, Kitchiner, & Curran, 2004). This makes intuitive sense because not all of the information that enters awareness is useful, and focusing on the most important task at hand at the expense of other thoughts/emotions facilitates both learning and productivity (DeMarie-Dreblow, 1988). However, it is important to differentiate this purpose of suppression from an attempt to control one's psychological content as a form of experiential avoidance (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). Such attempts to control are often counter-productive and often result in paradoxical increases in anxiety, even while attempting to relax (Adler, Craske, & Barlow, 1987; Lazarus & Mayne, 1990).

Researchers have attempted to explain these paradoxical effects. For example, Heide & Borkovec (1984) suggested that suppression attempts critically comprise of negative evaluations of emergent psychological or physiological changes, even if these are part of the process of relaxation. In support of this view, Maslach (1979) demonstrated that negative evaluation is the default response to physiological changes, when an alternative explanation is not available. In addition, Wegner, Broome, & Blumberg (1997) highlighted the role of attention in negative evaluations, which involve monitoring for a potential intrusion in order to suppress it. This suggestion is consistent with findings that suppression enhances attentional bias towards material perceived as threatening (Kircanski, Craske, & Bjork, 2008).

Negative evaluations also impact upon physiological responses to an event, usually leading to increased arousal (Ray et al., 2009). Of course, this arousal will, in turn, likely be evaluated negatively, thus creating a feedback loop between negative evaluations and suppression (Gerdes, 1979). Indeed Murakami, Ohira, Matsunaga, & Kimura (2009) found that suppression enhanced subsequent negative emotions and increased physiological arousal. Wegner (1994) has argued that this pattern disrupts the normal physiological habituation response and results in spiraling levels of arousal which prevents anxiety from dissipating.

There has been increasing focus on the concept of mindfulness in recent years (Chiesa, Serretti, & Jakobsen, 2013). The approach, adapted from Eastern philosophy, involves observing one's inner experience without judgment or evaluation (Davis & Hayes, 2011). Bishop et al., (2004) define mindfulness as having two elements: the focus of attention on immediate experience and an orientation of acceptance towards experiences, regardless of their desirability.

Although continuing research is necessary to fully understand the processes involved in mindfulness, it is believed that increasing awareness of thoughts and

emotions, as opposed to the more rigid responses necessitated by suppression- and control-based strategies, allows for a more flexible approach to dealing with complex emotions (Hayes & Feldman, 2004).

A number of psychotherapies now include mindfulness components to improve emotional well-being and mindfulness has been found to have a negative relationship with a number of psychological difficulties, such as neuroticism, thought suppression, dissociation, emotion regulation difficulties, depression, and anxiety (Davis & Hayes, 2011; Fjorback, Arendt, Ornbøl, Fink, & Walach, 2011; AM Hayes & Feldman, 2004; Hill & Updegraff, 2012). Psychological acceptance is conceptualized as the antithesis of experiential avoidance and emphasizes experiential contact with private events, in the absence of attempts to control or modify (Hayes, Strosahl, & Wilson, 1999). Researchers of acceptance have argued that experiential avoidance strategies (e.g., suppression) are detrimental to general psychological well-being (e.g., Chawla & Ostafin, 2007; Hayes & Feldman, 2004; Hayes et al., 1996). A number of studies have also found a strong relationship between experiential avoidance and anxiety (Buhr & Dugas, 2012; Tull & Gratz, 2008; Venta, Sharp, & Hart, 2012), while Kashdan, Barrios, Forsyth, & Steger (2006) found that emotional avoidance was a strong mediator of maladaptive coping and inability to control anxiety-related distress.

There now exists an ever-increasing body of positive clinical outcome data on acceptance in areas, such as: eating disorders (Baer, Fischer, & Huss, 2005; Forman *et al.*, 2007) psychotic symptoms (Bach & Hayes, 2002) and Obsessive Compulsive Disorder (OCD: Twohig *et al.*, 2010). A systematic review of Acceptance and Commitment Therapy (ACT: Hayes *et al.*, 1999) for managing anxiety found support for ACT for a range of disorders including mixed anxiety, maths anxiety, depression, and trichotillomania (Soo, Tate, & Lane-Brown, 2011). There is also evidence to support the use of Acceptance for various forms of anxiety, such as Post-Traumatic Stress Disorder (PTSD: Batten & Hayes, 2005), social anxiety (Block & Wulfert, 2000), mixed anxiety disorders (Arch *et al.*, 2012) and anxiety with depression (Forman, Herbert, Moitra, Yeomans, & Geller, 2007). Several experimental studies have directly compared acceptance with other protocols, finding favourable outcomes for acceptance over suppression or spontaneous coping (Masedo & Esteve, 2007), distraction (McMullen *et al.*, 2008) and cognitive control (Gutiérrez, Luciano, Rodríguez, & Fink, 2004).

Although they are topographically very similar, the exact nature of the relationship between mindfulness and acceptance has yet to be established. In some cases, the concepts of mindfulness and acceptance are used interchangeably (e.g. Erisman & Roemer, 2010; Vernig & Orsillo, 2009) while at other times acceptance is viewed as a component part of mindfulness (Bishop *et al.*, 2004).

One common feature of both acceptance and mindfulness appears to be that they change the way participants respond to anxiety, rather than the experience of anxiety itself (Codd, Twohig, Crosby, & Enno, 2011). Hofmann, Heering, Sawyer, & Asnaani (2009) reported that acceptance reduced physiological arousal, while self-reported anxiety was equal to that of a suppression group who showed increased physiological arousal. However, this effect has not yet been fully established. For example, Levitt, Brown, Orsillo, & Barlow (2004) found that acceptance was associated with significantly less

self-reported anxiety than suppression in response to a 15min CO<sub>2</sub> challenge. To date, few studies have directly compared the mindfulness and acceptance interventions making it difficult to determine a set of distinct or shared effects.

Furthermore, there have been few studies that have attempted to explore features of acceptance that may contribute towards positive clinical and experimental outcomes. For example, the concept of mindfulness is often used interchangeably with acceptance, without empirical evidence of whether the two are functionally related (e.g. Erisman & Roemer, 2010; Vernig & Orsillo, 2009). The current study compared the effects of four psychological strategies (acceptance, suppression, mindfulness, and endurance) and a control condition on physiological arousal to a stressor task. The stressor task comprised a rapidly-delivered series of verbal analogies. Physiological arousal was measured through skin conductance level (SCL) and subjective anxiety through self-report.

The primary aim of the study was to examine differences in physiological arousal and self-reported anxiety in response to the stressor task at pre- and post-intervention. Based on previous research, we predicted that acceptance would be associated with decreased arousal, but suppression would not. We had no specific predictions about the endurance or mindfulness strategies, but were interested to explore two related possibilities. (1) If acceptance and mindfulness were functionally similar, they would be associated with similar outcomes. (2) Participants given acceptance and mindfulness strategies may actually be engaging simply in endurance - simple perseverance without distinguishing thoughts from the individual, as in acceptance and mindfulness. In this case, one would expect outcomes across those three conditions to be comparable.

## METHOD

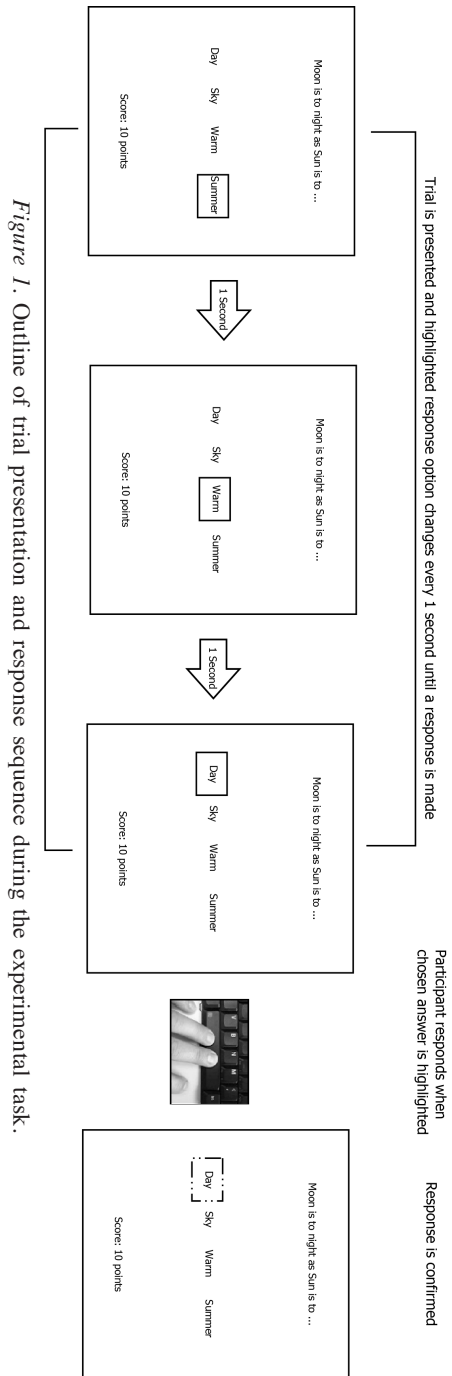
### *Participants*

Participants included 80 undergraduate and postgraduate students (60% female) from The National University of Ireland, Maynooth. None received incentives to participate. Their ages ranged from 18 to 40 years (mean= 27.12, *SD*= 6.37). Informed consent was obtained from each.

### *Setting, Materials, and Apparatus*

All aspects of the procedure were conducted individually in a laboratory. The experimenter was present in the room only during instructional and technical parts of the procedure, but remained seated outside at all other times. Participation lasted approximately 35min.

*Computerised procedure.* All aspects of the procedure involved a Visual Basic (VB6) computer program that controlled the presentation of instructions, the stress task, and video interventions. The program also recorded participants' responses, and



matched the timing of stimulus presentations and responses to participants' current SCL.

*Stress task.* The automated stress task comprised a battery of rapidly presented verbal analogy trials, in a specially designed format (see Figure 1). The verbal analogy trials were presented in the form of an analogical stem (e.g. Moon is to night as sun is to...) with four possible correct answers (e.g. Day, Sky, Warm, Summer). The task was structured so that considerable participant attention was required in order to select the correct answer (see Figure 1). During each verbal analogy trial, the analogical stem appeared at the top of the screen, with the four possible responses below. At 1sec intervals, one of the four answers, selected at random, was highlighted in red. In order to respond, participants were required to press the space bar when their chosen answer was highlighted. To encourage participants to engage with the task, 10 points were awarded each time a trial was answered correctly and a total score was displayed in the bottom of the screen. To ensure participants understood the format of the task and how to respond, the task was preceded by written instructions delivered on-screen and a video demonstration of how to respond appropriately.

*Self-report measure.* Participants' current level of anxiety was assessed on a 15-item self-report scale of eight relaxation-related (e.g. Relaxed, Calm, Composed, Tranquil) and seven anxiety-related adjectives (e.g. Tense, Restless, Agitated, Anxious), adapted from a study by Wegner et al., (1997). A 5-point Likert scale for responding ranged from 1 (Does not apply) to 5 (Definitely applies) to indicate how much each adjective described one's current state. The internal consistencies for the anxiety and relaxation sub-scales for the current study were moderate to high (Cronbach's  $\alpha = .656$  for relaxation and  $.803$  for anxiety).

*Physiological arousal measure.* Skin conductance (SC) was employed as a measure of physiological arousal. All SC measurements were obtained via the Nexus 4 SC recording apparatus, with two silver chloride (AgCl) electrodes attached to participants' fingers with Velcro straps. All SC data were recorded using the Biotrace 4 software program and measured in microsiemens ( $\mu S$ ). SC was recorded throughout the experimental procedure and analysed for three main time periods: Baseline, Pre-intervention and Post-intervention. Physiological arousal levels, as defined in this study, reflected tonic skin conductance and were calculated as the average SC response amplitude of the participant during each time period.

### *Procedure*

The experimental sequence commenced with the first exposure to the self-report measure as a baseline of anxiety. The electrodes were then placed on the index and middle fingers of the non-dominant hand, and a 2min baseline SCL was recorded. A sample verbal analogy followed immediately, along with instructions and a short video on how to complete the task. The first set of 25 verbal analogies appeared immediately. Participants' SCL was recorded throughout the task.

After the first set of analogies, participants were allocated to one of the four intervention conditions or the control condition. The experimental software was used to automatically counterbalance conditions and also allocate participants in a manner that

ensured balance across conditions for baseline self-reported anxiety. All interventions were based on an adaptation of the Swamp Metaphor by Hayes *et al.*, (1999) and were presented to participants as a strategy for coping with the stress induced by the previous analogy task and likely in the subsequent task (e.g. Gutiérrez *et al.*, 2004). The control condition simply presented time-matched content about nature. See Appendix 1 for full intervention text.

For illustrative purposes, the content of the Swamp Metaphor employed in the Acceptance Condition is presented below:

I would like you to imagine that the next test you will do is a bit like trying to cross a muddy swamp. Imagine that the swamp is full of dirt, rubbish and leftovers that smell really bad and really stink. What kind of thoughts do you think are going to occur in such a situation? It's likely that thoughts such as "This is too hard. I'm not good at this. I can't do anything this unpleasant or disgusting. It's not worth the effort. It's nonsense" will all show up even if you don't want them to. The best way you could possibly cross the swamp would be to notice all those thoughts and the distress they carry with them and let them be, to notice them and make room for them while you keep crossing the swamp. It's about being open to all the thoughts that may show up and the distress associated with them, about carrying them with you while you keep doing what you were trying to do in the first place- that is crossing the swamp and reaching the shore. Notice all the thoughts that show up while you perform the test and carry them with you because you can have whatever thoughts and act differently to what you think or feel. For the next part of the study, it is important that you imagine that doing the test is a bit like trying to cross the swamp, in that there is some kind of emotional or physical discomfort that seems to be standing in the way of something you want. You should think of the thoughts that show up during the test as being like the discomfort that stands in your way.

The Swamp Metaphor presented in the Mindfulness Condition was adjusted throughout to encourage mindfulness in terms of participants noticing their thoughts and redirecting their attention to the task (e.g., "notice all those thoughts without judging them and let them pass by, before bringing your attention back to crossing the swamp").

The Swamp Metaphor presented in the Suppression Condition was adjusted throughout to encourage the suppression of thoughts that might disrupt responding to the task (e.g., "The best way you could possibly cross the swamp would be to watch for all those thoughts and the distress they carry with them and try to stop them coming into your mind, so that you can keep crossing the swamp").

The Swamp Metaphor presented in the Endurance Condition was adjusted throughout to encourage perseverance with the task in spite of thoughts (e.g., "It's about taking all the thoughts that may show up and the distress that may come with them and just putting up with them, while you keep doing what you were trying to do in the first place- that is crossing the swamp and reaching the shore").

Each intervention or control was followed by two-minute rest period to allow stabilization of participants' SCL. This was followed by a second set of verbal analogies and finally a second exposure to the self-report measure of anxiety. This then marked the end of the experiment.

## RESULTS

Participants were randomly assigned to one of four experimental groups (Acceptance, Mindfulness, Suppression and Endurance) or the Control group. There was no significant difference in baseline levels of arousal  $F(4,75)= 0.183, p= 0.946$ , baseline self-reported relaxation  $F(4,75)= 0.72, p= 0.581$  or baseline self-reported anxiety  $F(4,75)= 0.138, p= 0.25$  across conditions.

Mean SCL increased in all conditions from Baseline to pre-intervention Test 1 (see Table 1). All conditions showed also showed an increase from pre-intervention Test 1 to post-intervention Test 2, with the exception of the Acceptance condition, which showed a slight decrease. In order to examine the effect of the emotion regulation strategies on arousal as measured by SCL, we conducted a 5 (condition) x 2 (time: pre- and post-intervention) ANCOVA with arousal as the dependent variable, time (pre- and post-intervention) as the within subjects variable (using the baseline SCL level as a covariate), and emotion regulation strategies as the between subjects variable (condition: Acceptance, Mindfulness, Suppression, Endurance, and Control). Complete data was available from 17 participants in the Acceptance group, 15 in the Mindfulness group, 18 in the Suppression group, 13 in the Endurance group, and 17 in the Control group.

*Table 1.* Mean and SD of SCL at the three critical time points.

	Acceptance	Mindfulness	Suppression	Endurance	Control
Baseline	5.54 (3.56)	5.07 (3.07)	4.83 (3.02)	5.19 (4.20)	4.64 (2.81)
Test 1	6.46 (3.96)	6.01 (3.15)	6.35 (3.85)	6.46 (4.66)	6.38 (4.06)
Test 2	6.34 (3.89)	6.31 (3.26)	6.97 (4.22)	6.72 (4.32)	6.85 (3.66)

The results revealed a significant main effect for condition after controlling for baseline SCL,  $F(4, 78)= 3.04, p= .02$ , partial  $\eta^2= 0.11$ . However, there was no significant effect for time and no significant interaction effect. Within contrast analysis showed a near-significant linear contrast for general effect of emotion regulation strategies on arousal,  $F(4, 74)= 2.43, p= .05$ , partial  $\eta^2= 0.11$ . All groups were associated with increases in arousal across time, with the exception of the Acceptance group, which showed a slight decrease (see Figure 2).

Post-hoc analysis (Bonferroni test) of the group effect showed a significant difference between the Acceptance group and Control (mean difference:  $-.179, SE= .059, p= .03$ ). The difference in physiological arousal level between the other groups did not reach the level of statistical significance.

The self-report measures showed a decrease in subjective relaxation for all conditions except Acceptance and an increase in subjective anxiety for all conditions (see Table 2). Two 5x2 mixed repeated-measures ANOVAs (one per sub-scale) showed a significant effect for time on both relaxation ( $F(1,78)= 22.7, p= .00$ , partial  $\eta^2= 0.22$ ) and anxiety ( $F(1, 78)= 40.5, p= .00$ , partial  $\eta^2= 0.342$ ). Neither condition nor interaction effects were significant (all  $p$ 's  $>.261$ ).



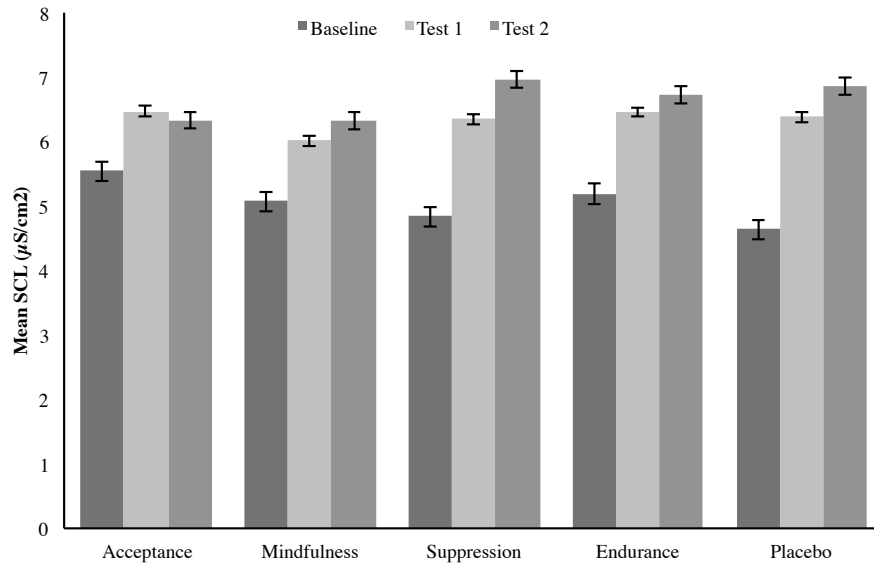


Figure 2. Mean SCL by condition at the three critical time points.

Table 2. Mean and SD of Subjective Levels of Relaxation and Anxiety on SAQ 1 and 2 Pre- and Post-Experiment.

	Acceptance	Mindfulness	Suppression	Endurance	Control
SAQ1 Relaxation	25.17 (4.75)	26.38 (4.06)	27.00 (4.62)	26.00 (3.24)	24.76 (5.0)
SAQ2 Relaxation	25.52 (3.51)	22.88 (4.78)	25.94 (5.12)	24.30 (3.9)	23.00 (6.31)
SAQ1 Anxiety	14.82 (4.95)	11.94 (3.65)	12.22 (4.06)	12.38 (4.17)	12.17 (4.06)
SAQ2 Anxiety	17.35 (4.44)	16.00 (3.14)	15.61 (4.88)	14.76 (5.49)	15.41 (3.26)

## DISCUSSION

The current study investigated the effects of different emotion regulation strategies (Acceptance, Suppression, Mindfulness, and Endurance) on physiological and subjective measures of anxiety in response to a mental stress task. Previous studies have indicated that acceptance is an effective strategy for reducing both physiological (Campbell-Sills, Barlow, Brown, & Hofmann, 2006) and subjective (Eifert *et al.*, 2009) arousal, while other research indicates that suppression is an ineffective strategy in this regard (Hofmann *et al.*, 2009; Murakami *et al.*, 2009). It is important for experimental researchers of these phenomena to explore the various features of these strategies which may influence outcomes. For example, perhaps mindfulness or simple endurance mediate outcomes for acceptance. To date, very few studies have explored these issues.

Our results suggest that acceptance was associated with significantly lower physiological arousal post-intervention. However, the difference was only significant when compared to the Control condition. Suppression, Mindfulness and Endurance groups

did not show a significant change between pre- and post-intervention. These findings appear to be consistent with previous studies, in which different physiological arousal patterns have been associated with acceptance and suppression (Campbell-Sills *et al.*, 2006). It must be acknowledged that the results of the current study do not allow us to make a definitive judgement on the impact of the interventions on arousal. However, they do indicate that future research in this area is warranted. Given that few studies to date have attempted to directly compare the physiological effects of these protocols the current research adds to the emerging body of literature on the effects of acceptance and mindfulness, and the detrimental effects of suppression (Najmi, Wegner, & Elliot, 2008; Wenzlaff & Wegner, 2000).

The self-report measures of relaxation and anxiety used here showed a significant effect for time (with relaxation decreasing and anxiety increasing), but not for condition. This is in spite of changes observed in physiological arousal. This inconsistency is not unusual. Indeed, some studies have found that emotional regulation strategies influence self-report, but not physiological, measures of anxiety (Levitt *et al.*, 2004), and vice versa (Gross & Levenson, 1993). However, the results in the current study are more likely a reflection of the time points at which the self-report measures were recorded. That is, self-report measures were taken at baseline and post-intervention test, whereas the SCL readings were measured at baseline, pre-intervention test and post-intervention test. In fact, self-reported anxiety and physiological arousal increased similarly between baseline and the post-intervention test. The main point of interest was the difference between the pre- and post-intervention tests. Had self-report measures also been taken at the pre-intervention test, we may have been better able to observe effects the strategies may have had on the self-report measures of anxiety.

The comparative lack of effectiveness of the Mindfulness condition compared to Acceptance in this regard is surprising, given the suggested similarity of the two approaches (Levin & Hayes, 2011). One potential explanation for this is that acceptance involves something more than the non-judgemental observation of thoughts (mindfulness). Indeed, the theory behind Acceptance and Commitment Therapy suggests that acceptance is more active in terms of requiring willingness to allow thoughts and feelings to occur and a choice to purposefully make experiential contact with new thoughts that arise, so that they become part of the current experience (Hayes *et al.*, 1999; McHugh, 2011). More specifically, both the mindfulness and acceptance interventions discriminate between feelings of discomfort and the individual who is having them. However, the acceptance intervention also specified that the discomfort is a necessary part of achieving the goal, while the mindfulness intervention simply asked the participants to observe. Luciano *et al.*, (2011) found that interventions aimed at helping participants differentiate private events from themselves and their behaviour (in this case by the application of comparison, deictic and hierarchical framing) were strengthened by the also promoting a perspective which emphasises regulation of behaviour. This interpretation might also provide some insight into the endurance condition, which promoted the behaviour in the presence of discomfort, without discriminating between the thoughts and the individual. We recommend that future studies examine acceptance- and mindfulness-based strategies in more detail, to determine if the differences found in the current study are replicable.

One potential alternative explanation for the current findings is that the act of performing the experimental task caused the relative changes in SCL of participants. Task performance and concentration are known to reliably increase electrodermal activity. However, levels would be expected to gradually decrease over time unless the task became more difficult or introduced novel stimuli (Cacioppo, Tassinari, & Berntson, 2007), which was not the case in the current study. On the other hand, emotional regulation strategies have been known to increase SCL and may explain the increased SCL observed during the post-intervention task in all groups except the Acceptance condition (Cacioppo *et al.*, 2007). However, the fact that the Control condition also increased is as yet unexplained and will require further study.

The findings could potentially be explained by the variability of skin conductance levels due to individual differences, a recognised issue when making inferences from some physiological measures. However, while there have been some attempts to compensate for this using range correction techniques and standardised scores, the most commonly used technique is to compare average levels across groups, as was done in this study (Cacioppo *et al.*, 2007). The “Baseline, Pre-test, Post-test” design used in the study combined with the ANCOVA was employed to account for individual differences as much as possible as it more fully equates groups on baseline levels and minimizes the variance in the outcomes (Tabachnick & Fidell, 2006). We attempted to similarly account for baseline subjective anxiety level by balancing this across conditions, however it is unclear what impact this had, if any, on the results.

It is also possible that the results stem from a lack of parity between brief lab-based strategies and therapeutic protocols employed with clinical populations. While microanalyses of strategies play an important role in the development of therapeutic models future studies should examine whether the short term effects recorded in the current study are maintained in the long term or in more ecologically valid settings (Newman & Erickson, 2003; Southam-Gerow, 2004).

In conclusion, the current research compared the impact of acceptance, suppression mindfulness, and endurance strategies on physiological and self-report measures of arousal using a novel stressor task. The results suggest that acceptance may be associated with different arousal patterns. Further research is recommended to examine the difference between acceptance- and mindfulness-based strategies.

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## APPENDIX 1 INTERVENTION SCRIPTS

The following text was common to all interventions:

I would like you to imagine that the next test you will do is a bit like trying to cross a muddy swamp. Imagine that the swamp is full of dirt, rubbish and leftovers that smell really bad and really stink. What kind of thoughts do you think are going to occur in such a situation? It's likely that thoughts such as "This is too hard. I'm not good at this. I can't do anything this unpleasant or disgusting. It's not worth the effort. It's nonsense" will all show up even if you don't want them to.

The text below was added, dependent on experimental condition:

*Acceptance intervention.* The best way you could possibly cross the swamp would be to notice all those thoughts and the distress they carry with them and let them be, to notice them and make room for them while you keep crossing the swamp. It's about being open to all the thoughts that may show up and the distress associated with them, about carrying them with you while you keep doing what you were trying to do in the first place- that is crossing the swamp and reaching the shore. Notice all the thoughts that show up while you perform the test and carry them with you because you can have whatever thoughts and act differently to what you think or feel. For the next part of the study, it is important that you imagine that doing the test is a bit like trying to cross the swamp, in that there is some kind of emotional or physical discomfort that seems to be standing in the way of something you want. You should think of the thoughts that show up during the test as being like the discomfort that stands in your way.

*Mindfulness intervention.* The best way you could possibly cross the swamp would be to notice all those thoughts without judging them and let them pass by, before bringing your attention back to crossing the swamp. It's about observing all the thoughts that may show up. Notice that you can observe these thoughts without getting caught up in them. You can let them go and bring your attention back to what you were trying to do in the first place- that is crossing the swamp and reaching the shore. Notice all the thoughts that show up while you perform the test and be aware of them. These thoughts are separate from you and from your actions. Your actions are taking place in the present moment, while your thoughts are just thoughts.

*Suppression intervention.* The best way you could possibly cross the swamp would be to watch for all those thoughts and the distress they carry with them and try to stop them coming into your mind, so that you can keep crossing the swamp. It's about not letting these thoughts come up and not letting them interfere if they do come up, so that you can keep doing what you were trying to do in the first place- that is crossing the swamp and reaching the shore (in other words watch for these thoughts so that they can be avoided or removed if need be). Watch for all the thoughts that show up while you perform the test. Try to avoid or remove them, to keep them from coming back, so that these thoughts don't have an effect on your actions.

*Endurance intervention.* The best way you could possibly cross the swamp would be to just keep going no matter what comes up. It's about taking all the thoughts that may show up and the distress that may come with them and just putting up with them, while you keep doing what you were trying to do in the first place- that is crossing the swamp and reaching the shore (in other words trying your best, even when the test gets difficult). Notice all the thoughts that show up while you perform the test and try to endure them as best that you can, even when it gets difficult. You can have any thoughts about the task and endure them, because they don't have to have any effect the task.