Considering Emotion Regulation and Responses to Failure and Success

by

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Abstract

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Emotion regulation (ER) is the process by which individuals influence which emotions they have, when they have them, and how they experience and express these emotions (Gross, 1998). The emotional Stroop task is a variation of the original Stroop colour-naming task in which words have an emotional loading for the target population. In the current study, measures of ER predict response times on an emotional Stroop task. Participants completed self-report questionnaires to assess each component of Gross' definition. Participants were randomly assigned to success or failure conditions of a computer game. The emotional Stroop task was administered before and after the emotional induction allowing change scores to be calculated. I hypothesized scores indicating low levels of ER result in greater distraction from the emotional Stroop task. Only group and gender emerged as significant predictors of emotional Stroop response latencies. Findings are explained and implications for future research discussed.

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Introduction

Self-regulation is related to student behavior, learning strategies, and optimal academic performance. According to Zimmerman, (1989) "students can be described as self-regulated to the degree that they are metacognitively, motivationally, and behaviorally active participants in their own learning process" (p. 329). So, why are there occasions when even students with good self-regulatory skills fail to employ them? I hypothesize that one explanation can be found by looking at emotion regulation.

Picture this: A student writes an exam and fails. When the exam is returned she is so distraught by the results that even though she is sitting in class she misses important course material and instructions for the next assignment. A different student in the class is surprised to receive 100% on the exam. She is so pleased with her success that she too misses important course material and instructions. These students may very well have employed different study strategies, set different goals, and experienced different emotions. They certainly received different feedback and results. And yet, both students exemplify poor emotion regulation as they become too preoccupied with their emotions to appropriately allocate attention. The purpose of this study is to begin to understand ways in which students' emotions interfere with their ability to focus on tasks. The research problem is conveyed in the following question: How does emotion regulation as measured by anxiety, fear of negative evaluation, and coping strategies predict changes in university students' attentional focus after an induced success or failure experience?

To assess emotion regulation, I rely on Gross' 1998 definition that emotion regulation represents "the processes by which individuals influence which emotions they have, when they have them, and how they experience and express these emotions" (1998,

p.275). Gross' definition is made up of three separate parts: *which* emotions are experienced, *when* they are experienced, and *how* they are expressed. It is important to emphasize that the "how" component of this definition does not refer to a process or mechanism but to the experience of emotion. In combining these concepts under a single rudiment, Gross marries the long-standing research traditions of psychoanalysis, anxiety, and coping (Gross, 1999).

The first of two aims of the current study is to assess the students' emotional regulation. I used self-report questionnaires to assess each part of Gross' process model of emotion regulation ("which," "when," and "how"). To assess *which* emotions are experienced, participants completed the State-trait Anxiety Index (STAI-form Y-2). To assess *when* emotions are experienced, participants completed the Fear of Negative Evaluation (FNE). And, to assess *how* emotions are expressed, participants completed the Coping Operations Preference Enquiry (COPE). The second aim of the current study is to evaluate how scores on the STAI, FNE, and COPE predict changes in attention following an induced emotional experience. I expect that scores indicating high emotion regulation will predict on-task allocation of attention operationalized as minimal emotional Stroop interference by words representing self-evaluation and affect. In comparison, I expect that indicators of low emotion regulation will predict distracted allocation of attention operationalized as significant emotional Stroop interference by words representing self-evaluation and affectivity.

Hypotheses

The central hypothesis of the current study is that self-reported affect, evaluative tendencies, and coping strategies (as representatives of the parts of emotion regulation)

will predict changes in attention as measured by the emotional Stroop after an induced success or failure experience. More specifically, I consider two hypotheses regarding how emotion regulation will predict changes according to experimental group.

In the failure condition, scores indicating low emotion regulation will predict longer colour naming latencies than scores indicating high emotion regulation for words that fall into the categories of negative self-evaluation and negative affectivity. Similarly, in the success condition scores indicating low emotion regulation will predict longer colour naming latencies than scores indicating high emotion regulation for words that fall into the categories of positive self-evaluation and positive affectivity. This hypothesis will be tested by calculating regression equations between the STAI, FNE, and COPE and the change in response latency for each category of words.

The second hypothesis is that in the failure condition scores indicating low emotion regulation will predict longer colour naming latencies than scores indicating high emotion regulation for positive self-evaluation and positive affectivity words because they represent qualities that the individual does not have, and thus still represent failure. To elaborate, it is just as likely that a student who receives negative feedback on an exam or assignment will be distracted by the emotions surrounding thoughts such as "I'm dumb" as by thoughts such as "I'm (not) smart." As such, the associated emotions will have an affect on the student's subsequent attention to material that follows the emotional experience. While positive emotions contribute to task enjoyment they may also negatively direct attention away from the task as the student relishes an unexpected success (Pekrun, 1992). This hypothesis will be tested by calculating regression equations between the STAI, FNE, and COPE and the change in response latency for

each category of words. These calculations are possible because the emotional Stroop was administered both before and after the emotional induction of success or failure.

The hypotheses in the current study are structured around Gross' 1998 definition of emotion regulation. As such, the following literature review links work on emotion regulation by Gross and others according to the "which," "when," and "how" components of emotion regulation made explicit in Gross' definition. To give further context to Gross' definition his process model of emotion regulation is explicated even though it does not directly apply to the current study. Then advancements in the field of emotion regulation are examined from a theoretical stand point and by critiquing several research approaches which provide a diverse albeit limited picture of how emotion regulation may be influential in various educational settings. Finally, research on the emotional Stroop is presented to explain how it might contribute to the study of emotion regulation.

Literature Review

Emotion Regulation

It is important to establish what emotion regulation is *not.* Emotion regulation is not simply having high levels of positive affect and low levels of negative affect; it is not the same as moods or mood dependent or congruent memory (Christianson & Loftus, 1987); it is not the same as an emotional episode; and although there is some overlap, it is not the same as emotion-focused coping (Gross, 1999; 1998). According to Gross (1999), emotion regulation is founded on Freud's work with psychoanalytic theory and anxiety (1959) and Lazarus' work on stress and coping (1966). Emotion regulation researchers make finer grained distinctions than these earlier larger rubrics. Now, emotion regulation refers to how emotions are themselves regulated. Emotion regulation is a self-process in

that it refers to steps one undertakes to regulate one's own emotions and not those of another. And, emotion regulation is characterized by a continuum of processes from conscious to unconscious (Gross, 1998; 1999). It is with these criteria in mind that emotion regulation can hold a pivotal role in managing the constantly changing cognitive, social, and behavioral demands placed on students. "Emotion regulation refers to the processes by which individuals influence which emotions they have, when they have them, and how they experience and express these emotions" (Gross, 1998, p.275).

Gross' process model of emotion regulation is based on the tendency for emotions to be generated once a situation has been appraised as important and then modulated as needed (1998). Gross suggests a process model approach since emotions can be regulated at different stages of their generation. The two broadest distinctions are based on temporal occurrence of the regulation. Antecedent-focused emotion regulation takes place before the emotion is ever generated; whereas, response-focused emotion regulation takes place after the emotion is generated. Antecedent-focused emotion regulation can occur at any of four more specific emotion generation points including situation selection, situation modification, attention deployment, or cognitive change. However, once the emotion is generated physiological, behavioral, and experiential responses will occur and they can then be regulated by response modulation only (Gross, 1998). "Thus, response-focused regulation mops up one's emotions: antecedent-focused regulation keeps them from spilling in the first place" (Richards & Gross, 2000, p. 411). Please see Appendix A for Gross' process model of emotion regulation.

Gross and his colleagues look at two specific techniques used to regulate emotions and the respective affective, social, and cognitive costs and benefits: reappraisal

and expressive suppression (Gross & John, 2002, 2003; Gross & Levenson, 1997; Richards & Gross, 2000). Reappraisal is a form of cognitive change and is therefore antecedent-focused. In contrast, expressive suppression is a type of response modulation and is therefore response-focused (Richards & Gross, 2002).

Gross utilizes a fairly consistent methodological platform for investigating cognitive consequences of emotion regulation. Participants watch graphic films or slides (e.g. a physical and verbal altercation between a husband and wife; or an arm amputation) intended to induce negative emotion. Participants are randomly assigned to control, suppression, or reappraisal groups. Before viewing the slides, suppression participants are explicitly instructed to "please try to behave so that someone watching you would not know you are feeling anything at all" (Richards & Gross, 2000, p.413) and reappraisal participants are asked to "please try to adopt a neutral attitude" (p.416). After the condition, participants complete a self-report emotion measure and some form of recall task related to the film. This methodology provided substantial data in support of Gross' process model and for differential affects of emotion regulation strategies on cognitive functioning (Richards & Gross, 2000). While Gross' process model does not directly relate to the current thesis study directly it has important implications for future research in this area.

The current research, like Gross' model, is based on a belief that emotion regulation is effortful (Richards & Gross, 2000; Gross, 2001). This assertion is supported by findings that indicate that more sustained effort is required to engage in continuous expressive suppression than to make one reappraisal. Results show that in response to a high-emotion stimulus, control ($M = 2.8$, $SD = 1.4$) and expressive suppression ($M = 2.3$,

SD = 1.2) participants report the same level of subjective experience of negative emotions ($t(59) = 1.56$). This level is significantly higher than the level of negative emotional experience reported by reappraisal participants ($t(61) = 2.48$, $p < .05$). Expressive suppression participants might be able to hide external displays of their feelings but they still very much experience the full impact of the emotions. Expressive suppression but not reappraisal led to memory decrements for both high and low emotion stimuli (Richards & Gross, 2000). This stance suggests that attention is finite and that unregulated emotions divide attention leaving less available for the principal task (Gross & Levenson, 1997; Pekrun, 1992; Richards & Gross, 2000; Schutz, Davis, & Schwanenflugel, 2002; Wegner, 1994).

Students' Emotions: Which emotions and when?

Two areas of the brain are irrefutably linked to the production of emotion and cognition: the amygdala and the neocortex respectively. The relationship between the limbic and cortical centers involved with emotion is bidirectional. A non-emotional stimulus travels from a sensory receptor to the thalamus and then to the appropriate cortical center for processing; however, when a stimulus is emotionally charged, a small part of the stimulus goes directly to the amygdala allowing the emotional production, response, and experience cycle to begin before the higher level neocortex registers the signal (LeDoux, 1996). This privileged role of the emotional amygdala to override and triumph the cognitive neocortex, deemed an "emotional hijacking" by Goleman (1996), is of paramount importance in establishing the impact of emotions in learning environments. From an evolutionary perspective, emotions prepare us for threats or

opportunities either physical or psychological and prime us for necessary action. LeDoux (1996) explains that:

> While conscious control over emotions is weak, emotions can flood consciousness. This is so because the wiring of the brain at this point in our evolutionary history is such that connections from the emotional systems to the cognitive systems are stronger than connections from the cognitive systems to the emotional systems. (p.19)

This is not to say that there are two separate systems divided between "reason and passion." Rather, emotions and cognitions function in a reciprocal manner so that cognitive information such as appraisals inform emotional experiences which then in turn influence future cognitive interpretations (Lazarus, 1991).

One glance around a classroom or testing environment leaves no doubt that emotion is both present and influential. The important questions become *which* emotions are present, *when* are they brought about, and *how* do the emotional episodes affect students? These questions fit into Gross' definition of emotion regulation. The domain of educational psychology is one of the few that Gross has not directly linked to his definition (1998). In order to apply Gross' definition these three components must be defined. Recent qualitative work by Pekrun, Goetz, Titz and Perry explored the range of emotions experienced by students and the frequency (2002). Students report both negative and positive emotions including anxiety, boredom, pride, and enjoyment. Research investigating the emotions that students experience provides options for the *"what"* portion of Gross' definition. Other researchers focus on emotionally precarious academic situations such as exams, tests, lectures, or assignments. This research defines

the *"when"* component of Gross' definition. And finally research on the negative and/or positive effects of emotion on cognition, learning, and behaviour (Blair, 2002; Gumora & Arsenio, 2002; Howse, Calkins, Anastopoulos, Keane, & Shelton, 2003; Pekrun, 1992; Pekrun, Goetz, Titz, & Perry, 2002; Schutz & Davis, 2000; Schutz & DeCuir, 2002; Schutz et al., 2002; Smith & Kleinman, 1989) characterizes the *"how"* component of Gross' definition. Through substituting different emotions, situations, and outcomes into Gross' definition, advancements may be made in understanding emotion regulation in student learning environments. In the current study, students report their anxiety levels according the STAI as the "which" component; the "when" component is measured by the FNE and manipulated by feedback from a rigged success or failure task: and, the "how" component is an independent measure assessed by the COPE and an outcome variable assessed by changes in attention after feedback according to the emotional Stroop task.

Test Anxiety. Within both academic and empirical research settings the most readily available example of emotional hijacking is test-anxiety. Test anxiety is considered to be a multidimensional construct; it is made up of both cognitive and emotional components (Blankstein, Flett & Watson, 1992). Up to 15% of high school students report experiencing negative test-anxiety (Sorić, 1999). When looking at university students, Endler, Kantor, and Parker (1994) illustrate that both male and female students reported similar levels of state-anxiety in a neutral situation (at the beginning of term) and significantly increased anxiety levels during a stressful situation (just before writing an exam). Results also show that females report a greater change in

anxiety as a situation changes from non-stressful to stressful (Endler et al., 1994; Endler, Parker, Bagby, & Cox, 1991).

Researchers continue to implement and evaluate strategies to reduce test-anxiety. These include practices such as hypnosis (Pearce, 1999; Gruzelier, Levy, & Williams, 2001), dance (Erwin-Grabner, Goodill, & Hill, 1999), relaxation training, systematic desensitization, or cognitive-behavioral interventions (Kennedy & Doepke, 1999; Deffenbacher & Hahnloser, 1981) to help students overcome test-anxiety. Such interventions have had inconsistent success. Reports of decreased anxiety do not necessarily mean that students no longer experience test anxiety. Rather, such reports may indicate a reduction in debilitating test-anxiety and adoption of a more facilitative anxiety (Watson, 1988; Raffety, Smith, & Ptacek, 1997).

Other Emotions on other occasions. Pekrun, Goetz, Titz, and Perry (2002) investigate emotions in several academic settings including classrooms, home studying, note taking, and exam writing. Their series of qualitative and quantitative investigation reveals that while anxiety is the one emotion reported most frequently (15% - 25% of the time), really "there was virtually no major human emotion not reported by [their] participants" (p. 93). And, happily, positive emotions were reported about as often as negative emotions. To create a taxonomy of academic emotions, the reported emotions were classified according to two dimensions: valence and activation. Table 1 summarizes and categorizes by valence and activation level the emotions most frequently reported in and shared by academic settings.

Table 1: Pekrun et al.'s (2002) Taxonomy of Academic Emotions

		Valence	
		Positive	Negative
Activation Level	Activating	Enjoyment, hope, pride	Anger, anxiety, shame
	Deactivating	Relief	Hopelessness, boredom

Pekrun et al. (2002) suggest two major components that contribute to students' experiences of these reported emotions: the nature of a situation and the appraisal of it. First, the *nature* of particular learning situations contributes to the experience of emotion. For example, high-stake examinations tend to elicit feelings of anger, frustration, or anxiety (Schutz et al., 2002). Any academic situation involving evaluation is viewed as something fearful, and adolescents report fear of negative evaluation as their primary cause of stress (Stark, Spirito, Williams, & Guevremont, 1989). Burdening students with excessive demands evokes similarly pervading fears of failure. As an escape from either excessively high or excessive low academic demands, students frequently report feeling bored (Pekrun et al., 2002). Situations in which students are waiting for feedback on a task are surrounded by feelings that range from anticipatory-joy and hope to hopelessness and anxiety (Pekrun, 1992). Likewise, once students have received feedback they may come to realize any combination of joy, disappointment, pride, sadness, anger, or shame (Pekrun, 1992; Schutz & Davis 2000; Turner, Husman, & Schallert, 2002). Failure situations can in particular evoke feelings of shame in vulnerable students according to a study by Turner et al. (2002).

Second, situational *appraisal* contributes to the experience of emotion. Smith, Haynes, Lazarus, and Pope (1993) suggest that "attributions contribute to the construal of one's circumstances but that this construal must be further appraised to produce emotion" (p.921). Emotional experiences require more than "factual" attributions into categories of locus, stability, and controllability (Weiner, 1985). Instead, the situation must be appraised based on its implications for individual wellbeing (Lazarus, 1991; Roseman, Antoniou, & Jose, 1996; Schutz et al., 2002; Schutz & DeCuir, 2002; Schutz & Davis, 2000; Smith et al., 1993). Emotional experiences occur when we compare where we are to where we want or need to be. Essentially, "goals act as the transactive point for our understanding of constructs such as cognition, motivation, and emotion" (Schutz & DeCuir, 2002, p.127). Transactive comparisons occur during three phases of a task: forethought, performance, and self-reflective (Schutz & Davis, 2000). Each phase is susceptible to emotional hijacking.

During the forethought or preparation phase, emotions help determine the saliency of both the task and the goal to the student's wellbeing. Antecedent-focused emotion regulation occurs during this phase (Gross, 1998). Positive appraisals, strong emotion regulation, and heightened intrinsic motivation generate positive activating emotions such as enjoyment, hope and pride in tackling the task as a challenge (Pekrun et al., 2002; Pekrun, 1992; Schutz & Davis, 2000). In contrast, negative appraisals, weak emotion regulation, and low motivation are linked to anger and anxiety toward a threatening task (Pekrun et al., 2002; Pekrun, 1992; Schutz & Davis, 2000).

During the performance phase students actively complete the task while evaluating their level of preparation, the difficulty of the task, and the extent of problems

(Schutz & Davis, 2000). Emotions again run the chance of dominating the situation and hindering performance. Either positive or negative emotions can occupy a person's mind and can diminish the finite cognitive resources available to dedicate to a task (Meinhardt & Pekrun, 2003; Pekrun, 1992; Schutz et al., 2002; Gross & Levenson, 1997; Wegner, 1994). There is much support that negative deactivating emotions such as hopelessness or boredom interfere with cognitive tasks by generating task-irrelevant thoughts and ruminations which are likely to take attention away from the target task (Meingardt & Pekrun, 2003; Pekrun et al., 2002; Pekrun, 1992; Schutz et al., 2002). Recent evidence also reveals that positive emotions can also result in reduced attention to a target task (Meingardt & Pekrun, 2003).

After completion of the task, self-reflection allows time to make sense of the results; this too is closely tied to emotions. Response-focused emotion regulation occurs during this phase. For example, students who become fixated with negative emotions may ruminate on errors made during a test. In turn, they may experience increased levels of negative affect (Turner, Thorpe, & Meyer, 1998) and specifically be more likely to experience shame and anxiety (Pekrun et al., 2002; Pekrun, 1992; Schutz et al., 2002).

Linking these three phases with measures of emotion regulation provides an avenue for future research. The presented research suggests that positive and negative emotions are present and influential in learning environments. Next I consider specific examples of how failure to regulate emotions interferes with students functioning in academic situations including distracting attention from important information and tasks.

Linking emotion regulation and academic settings

Walden and Smith do not hesitate to report that "research on emotion regulation is quite new" (1997, p. 7) and Boekaerts, Pintrich, and Zeidner conclude the *Handbook of Self-Regulation* with the vague question: "How should we deal with emotions or affect?" (2000, p. 754). Nonetheless, several large reviews of emotion regulation were published in the late 1990s (Gross, 1998, 1999; Gross & John, 2002; Underwood, 1997; Walden & Smith, 1997) recording advancements in the field. The following review presents literature that considers emotions and emotion regulation in relation to students' academic performance. Other work has looked at social, behavioral, and athletic implications linked to students' emotion regulation but are beyond the scope of this review (Kobak & Ferenz-Gillies, 1995; Rubin, Coplan, Fox & Calkins, 1995; Lazarus, 2000; Gross & John, 2003; de Castro, Bosch, Veerman & Koops, 2003; Denham, Blair, DeMulder, Levitas, Sawyer, Auerbach-Major, et al., 2003). Literature is presented from a life-span developmental perspective beginning with novice students and concluding with mature students across a variety of learning environments.

Teachers, parents, and governments all want children to be ready to learn by the time they enter formal schooling (Blair, 2002). However, currently there is substantial evidence that the traditional notion of what deems a child "school ready" (such as the ability to write her name) may not actually render children optimally primed to learn (Blair, 2002). Many early education teachers "are more concerned with children's regulatory readiness for school activities . . . than with more strictly cognitive and academic aspects of readiness" (Blair, 2002, p. 113). Presumably all average children do have the cognitive resources to learn how to read and write; however, not all children

function at the same self-regulatory level. Students must have strong self-regulation in order to apply the necessary concentration, dedication, persistence, drive, and patience to successfully remain focused and absorb presented information (Blair, 2002). In a sample of children aged five to eight, Rydell, Berlin, and Bohlin (2003) found that high anger emotionality and low regulation of positive emotions and exuberance predicted externalizing problem behavior. They also found that high fear emotionality and low fear regulation predicted internalizing problem behavior. These changes were evident 1.5 years after initial emotion regulation assessment according to parent reports on questionnaires designed specifically for the study.

From a longitudinal perspective a team of researchers from North Carolina (Howse, Calkins, Anastopoulos, Keane, & Shelton, 2003) investigated the relationship between preschool levels of emotion regulation and self-regulation and kindergarten academic achievement. In this age group researchers have been more concerned with distractibility, approach/withdrawal, and persistence than with more mature forms of regulation such as goal setting and strategic planning (Howse, et al., 2003). The primary hypothesis was that both emotion regulation and behavioral self-regulation were related to achievement test scores. They argued that students prone to frustration or anger in the classroom have more difficulty learning. Multiple measures of self-regulation, emotion regulation, and achievement were collected from 154 mother-child pairs. During a laboratory session, observers recorded children's behaviour when presented with frustration tasks. Results showed low to moderate correlations between the Emotion Regulation Checklist (ERC; Shields & Cicchetti, 1998) and kindergarten achievement scores on literacy ($r = .28$, $p < .01$), math ($r = .40$, $p < .01$) and listening ($r = .37$, $p < .01$).

Moreover, low ERC strongly correlated with both regulatory problems in the classroom and at home as measured by the Child Behaviour Checklist (parent and teacher report forms). Hierarchical regression analyses suggest that self-regulation was a significant mediator between emotion regulation and achievement scores such as literacy and math.

Brazelton and Greenspan assert "emotion is not just a part of cognition; it precedes it" (2000, p. 11) is corroborated by Howse et al.'s (2003) finding that self-regulation mediates emotion regulation and achievement. Howse et al. (2003) suggest that future research should examine whether emotion regulation precedes the development of self-regulated learning behaviors. As students get older, it is quite possible that early emotional regulatory lapses will impair the development and use of a wide variety of self-regulatory strategies that aid in staying on task. This serves a double blow to students as they are less well equipped to successfully regulate emotions despite an increasing need to do so.

Clearly the educational environment becomes more competitive, difficult, and demanding over time. By middle school the possibility unregulated emotion may distract attention from the task at hand, as has been discussed, poses a major problem. Gumora and Arsenio (2002) investigated the correlational relationship between general emotionality, emotion regulation, affect, and academic achievement. In particular, they hypothesized that negative affect, unless sufficiently regulated, negatively impacts achievement. To test this hypothesis a sample of 103 middle school students completed various self-report scales. Academic performance of these students was assessed according to grade point averages on a 4-point scale and earlier educational achievement test records (Gumora & Arsenio, 2002). From these measures the authors concluded both

emotional dispositions and academically related affect are significant in school success even after controlling for cognitive variables. Moreover, the salient impact of emotion on a wide range of academic tasks such as homework, tests, and quizzes might suggest there is a "global affective reaction to academic work" (Gumora & Arsenio, 2002, p. 408).

Boekarts and Leiden (1993) investigated ways anger experience, expression, and control may affect academic results in school (n = 248; mean age 11 years). Boekarts divided the notion of anger into several smaller constructs: "Trait-Anger" refers to how often students report experiencing anger; "Anger-In" and "Anger-Out" refers to ways students express anger; and "Anger-Control" refers to ways students try to reduce the expression of anger. Results indicate that different forms of anger expression but not frequency of anger experiences may impact overall GPA.

Looking at how college and university students' academic achievement and learning is influenced by academic emotions, Pekrun and colleagues (1998; 2000; 2002) undertook a series of studies. These studies utilized self-report questionnaires and grades to assess students' academic emotions, academic interest, learning strategies and effort, task irrelevant thinking, and overall academic achievement. In his 1998 study, Pekrun reported learning-related academic emotions such as enjoyment or boredom correlate closely with interest, academic effort, task-irrelevant thinking, and achievement. Results showed emotions measured early in semester predicted final exam marks and cumulative final course grades. Positive emotions predicted high achievement; negative emotions predicted low achievement. Interestingly, hopelessness and boredom were more closely related to low achievement than was anxiety. (Pekrun, R., Molfenter, S., Titz, W., & Perry, R.P, 2000 as cited in Pekrun et al., 2002). On a larger scale, negative academic

emotions predicted student drop-out rates (Ruthig, Hladkyi, Hall, Pekrun & Perry, 2002 as cited in Pekrun et. al., 2002). These findings do not necessarily imply single direction causation nor do they necessarily generalize to all students; further research on academic emotions is needed.

Medical school and law school represent challenging and demanding professional programs. Moreover, anyone in these programs has already demonstrated a certain level of academic excellence. We might expect that if any student should have mastered the art of emotion regulation it would be these "expert learners." However, studies show these students must struggle to regulate a whole new set of emotions that become activated within their learning environment. Emotions are powerful enough to thoroughly disrupt the attention required for cognitive functioning and performance in these older students.

Medical students often report "the ideology of affective neutrality is strong in medicine; yet no courses in the medical curriculum deal directly with emotion management, specifically learning to change or eliminate inappropriate feelings" (Smith & Kleinman, 1989, p. 57). These students face a whole new challenge in emotion regulation as the boundaries of human contact, privacy, and sensitivity are stretched to new extremes. Smith and Kleinman (1989) observed and interviewed students during their first 3-years of medical training as they interacted with the human body. When asked, the students hesitantly expressed feelings of embarrassment, disgust, and arousal. The students employed various strategies to regulate these emotions including transforming personal contact into an objective event (situation modification), focusing on the positive emotions from learning (cognitive change), either blaming, mocking, or showing sympathy for the patient (attentional deployment), or avoiding sensitive contact

altogether (situation selection). These tactics fit into Gross' process model of emotion production at an antecedent-focused level. Results from studies conducted by Gross' lab and discussed earlier imply that as antecedent-focused strategies these regulatory strategies should interfere with memory less than response-focused strategies.

In another study, freshman medical students' emotions were collected via self-report questionnaires during the time surrounding the gross anatomy exam: before the exam, after the exam, and then directly after grades were released (Wolf, Heller, & Camp, 1995). In a sample of 184 students threat emotions decreased over time in both students who passed and failed the exam. Differences between students who passed or failed emerged when passing students reported benefit emotions and failing students reported high levels of perceived harm.

Law school is another situation in which mature and proficient learners are faced with new emotion regulation challenges. Díaz, Glass, Arnkoff, and Tanofsky-Kraff (2001) investigated first year law students' abilities to handle two different academic hurdles: an end of the year exam in contracts and an oral argument. One hundred and eighty-four first-year law students (female = 93) released their LSAT, GPA, exam grades, and oral performance ratings to researchers. Student anxiety was assessed by the State-trait Anxiety Inventory, the Reactions to Tests, and the Personal Report of Communication Apprehension. The Checklist of Positve and Negative Thoughts, and the Social Interaction Self-Statement Test – Public Speaking assessed student levels of negative thoughts. These measures along with Self-Efficacy Scales were collected at 5 different times during students' first year of study. Results showed regulation patterns

that work to regulate emotions during law school written exams did not aid anxiety reduction during oral arguments (Díaz et al., 2001).

Most of the research presented in this literature review indicates that study of students' emotions is relatively new. In stark contrast in 1938 Charles Howard Brown undertook a study to investigate students' emotional reactions before an exam. Brown's interest in the subject arose from personal observations that as the size of universities increased personal contact decreased. As a result, exams became the primary and often sole method of evaluation. Brown reported that students were becoming so consumed by examinations that suicide and drug use rates rose among students (1938). Brown created and administered a 70-item emotion responding questionnaire to 505 college students. Items that asked about subjective feelings of nervousness before an exam were most highly correlated with the total score of the questionnaire. Also interesting to note, 80% of students reported they would rather write a paper than an exam, 71% of respondents reported getting distracted during an exam, and 88% reported feeling nervous (Brown, 1938). The conditions under which students write exams, the pressures of standardized tests, and the level of competition for graduate school and professional programs has only increased since 1938 and yet there is still little known about the impact of emotions on students' academic functioning.

The main question thus far has been: "Do students' emotions influence their academic learning, self-regulation, and achievement?" (Pekrun, Goetz, Titz, & Perry, 2002, p. 96). The studies described above imply that, yes, a wide range of emotions are active and influential. The influence of both negative and positive emotion is apparent in allocation of attention (Meinhardt & Pekrun, 2003). The emotional Stroop task works

under the premise that persons will devote more attention to threatening words and therefore is a useful tool in measuring changes in attention following an emotional experience.

The Emotional Stroop Paradigm

In 1935 J.R. Stroop published his first study on attention and interference. There were two parts to this study. First, participants were asked to read a series of 10-12 words written on an index card. Some cards had words printed in coloured ink and others were printed in black ink (control). Stroop presented 100 words; there were five target colour-name words (red, blue, green, brown, purple). Each target word was printed twice: once in a matching colour and once in a colour that did not match what the word described. Stroop found the time required to *read* the presented word was not affected by the colour of the ink it was printed in (Stroop, 1935).

Stroop (1935) used a similar method for the second part of the study. For this portion participants had to name the colour of the ink a word was written in or name the colour of a solid-colour square (control). Stroop found it took participants 74% longer to name the ink colour of incongruent colour words than to name the colour of the control square (1935). It is likely these early findings were tapping into fundamentals of cognition, attention, and interference (MacLeod, 1991). Stroop's original findings have been replicated and extended over the past 70 years; although, the strongest interference primarily is still found in colour-naming of incongruent colour words (see Williams, Mathews, & MacLeod, 1996; Mathews & Harley, 1996; MacLeod, 1991; for reviews). Of particular interest to the study of emotions and emotion regulation is a variation of this original task known as the emotional Stroop task.

Essentially the emotional Stroop task modifies the original color naming task to look at cognitive processing associated with emotionally salient words. First, researchers wanted to know if the semantics of a word was related to the interference seen in the Stroop task (Dairymple-Alford, 1968, 1972; Klein, 1964). For example, Dairymple-Alford (1968) found that words implicitly linked to a colour (e.g. blood or grass) cause significant interference (also, Scheibe, Shaver, & Carrier, 1967). Geller and Shaver (1976) found self-referent words had longer colour-naming times when presented to a participant seated in front of a mirror.

In the 1980s researchers began presenting words with particular emotional valence and content to populations suffering from psychopathologies related to anxiety and depression. Populations suffering from general anxiety disorder (Mathews & MacLeod, 1985), panic disorder (McNally, Amir, Louro, Lukach, Riemann, & Calamari, 1994), phobias (Watts, McKenna, Sharrock, & Trezise, 1986), social phobia (Hope, Rapee, Heimber, & Dombeck, 1990), post-traumatic stress disorder (Foa, Feske, Murdock, Kozak, & McCarthy, 1991), and depressive disorder have shown consistent and strong Stroop effects when presented with words specific to their condition (see Williams, Mathews, & MacLeod, 1996; Mathews & Harley, 1996; MacLeod, 1991; for reviews). A typical emotional Stroop interference effect is approximately 30-40msec in magnitude; however, there are a few studies that show much larger effects. For example, Watts et al. (1986) presented words such as "spider" or "web" to persons with arachnophobia and found interference effects almost as strong as the original Stroop effect for colour words (effect size = 189msec). Likewise, a 1994 study by Thrasher, Dalgleish and Yule of survivors of a ferry disaster showed an effect size of 327

milliseconds. Collectively, findings suggest semantic processing of emotion evoking words interferes with performance of the Stroop colour-naming task. Such delays are thought to reflect the greater strength of processing associated with threatening words and thus their greater ability to distract from the overt task of colour-naming (Egloff & Hock, 2001; Mathews & MacLeod, 1985).

Curious about the relationship between state and trait anxiety and emotional Stroop interference, Egloff and Hock (2001) had 121 university students complete the State-trait Anxiety Index (STAI) and complete an emotional Stroop task that presented ego-threat words, physical-threat words, and control words. They found no main effect for either state or trait anxiety. However, a stepwise multiple regression analyses revealed that the interaction of state and trait anxiety contributes significantly to the Stroop effect. For individuals high in trait anxiety, state anxiety was positively related to emotional Stroop interference; however, there was no relationship for individuals with low trait anxiety. This provides evidence that heightened anxiety leads to a hypervigilance (Egloff & Hock, 2001) that may be extended into the other pathologies discussed above.

The above cited studies illustrate that traditionally emotional Stroop response latencies are compared either (a) between a pathological and control group or (b) between emotional and non-emotional words within a particular group. However, a few recent studies use the emotional Stroop as a pre-post measure. This is a relatively novel use of the emotional Stroop task. In particular, two studies investigate the effectiveness of emotional Stroop as a predictive measure of the efficacy of treatment programs and rehabilitation.

Cox, Hogan, Kristian, and Race (2002) used the emotional Stroop task to assess alcoholic abusers' (n = 14) attention to alcohol related words compared to control participants (n = 16). The emotional Stroop was administered at admission to an alcohol treatment program and was then re-administered four weeks later directly before discharge from the program. Results showed that alcohol abusers who relapsed three months after discharge had displayed greater increases in attention to alcohol related words at discharge than either the control group or abusers who did not relapse. This led the researchers to conclude these participants had shown increasing attentional bias for alcohol related words during treatment.

Spinks and Dalgleish (2001) administered an emotional Stroop at two time points to predict Seasonal Affective Disorder (SAD) symptoms. Twenty-one participants classified by the DSM-IV as suffering from SAD completed one emotional Stroop task in November/December when their symptoms were severe and then another one in June/July of the following year when their symptoms were dormant. The researchers found longer colour-naming latency on both season-related and negative words than neutral words at both administrations. Results also, show the greater the amount of emotional Stroop interference for negative words relative to neutral words the greater the mood and symptom improvement in the summer.

Two fundamental differences emerge between the aforementioned dual administration of the emotional Stroop task and its use in the current study. First, neither Cox et al. (2002) nor Spinks and Dalgleish (2001) used pre/post administration within the same experimental session. Using a pre-post emotional Stroop has two important advantages. Foremost calculating difference scores between identical words at two

separate presentations rather than between matched but nonetheless different control words reduces error variance. Second, participants are their own controls. Consequently, particularly fast or slow average individual reaction times are controlled for by subtracting individual pre-manipulation response times from post-manipulation times. For the current analyses, only difference scores are used to make comparisons between participants. The other difference is that in the current study the emotional Stroop task is used on a non-clinical sample exposed to an experimental manipulation. This allows an initial consideration of the emotional Stroop task in tapping into discrete and induced changes in arousal levels in response to manipulations.

The emotional Stroop effect can be explained by connectionist explanations of cognition (Williams, Mathews, & McLeod, 1996). Connectionist theory explains cognitive processing occurs within a system of weighted and interconnected modules. These modules send and receive information to and from other modules creating pathways connecting input units, intermediate units, and output units. The strength of a pathway is directly related to the strength of these connections. Automaticity is a function of the combined weightings of pathways; the greater the weight of a particular pathway, the greater the likelihood that cognitive processing will follow that pathway and interfere with the processing of pathways with lower weights.

Connectionist theory predicts that when two simultaneously activated pathways convene at a shared connection interference or facilitation is determined by the weighting of the pathways and the nature of the activation. Facilitation occurs when pathways have compatible activations; interference occurs when pathways have conflicting activations. In the case of the original Stroop task, participants are faced with two conflicting inputs:

word-reading and colour-naming. The two input units clash as automatized reading pathway interferes with the slower purposefulness required to colour-name; the result of this competition for activation of the shared unit manifests as delayed colour-naming.

The emotional Stroop task adds another dimension to the competition: semantic value. Essentially, when individuals read words that have a strong emotional valence an associated emotional pathway is activated; this emotional pathway interferes with the colour-naming pathway just as the pathway for word-reading interfered originally. With reference to Watts et al.'s 1986 study:

> the task demand unit places the intermediate units for naming the ink color in the most responsive part of their dynamic range. However, the emotional salience of *spider,* its greater input activation level, or stronger connections in the word pathway means that more activation accumulates at the intermediate units despite the task demand units for name color. The result is that, although the participant is attempting not to attend to the word, information flows along this pathway anyway. (Williams, Mathews, & McLeod, 1996, p. 15)

The connectionist explanation makes the emotional Stroop task well suited for measuring change in attention after an emotional experience.

The literature presented uses the parts of Gross' definition to investigate research linking emotion regulation to learning environments and as a framework for the current study. For larger context, Gross' process model was also explicated. Finally the emotional Stroop task was explained in terms of theoretical evidence and application in the current study.

Method

Participants

As part of a larger study, University of Victoria students were recruited in one of two ways. The first method used in-class recruitment of undergraduate Psychology, English, or Education students. After expressing initial interest, students were informed that after completion of the study they would receive a $5 stipend for their participation. The second method of recruitment used Psychology 100 students who volunteer for the study through a subject pool. These students received extra credit points for participating.

Due to the nature of the study any volunteer who reported uncorrected visual problems, vertigo, or colour-blindness were excluded. A total of 155 undergraduate students completed the questionnaire packets required for the first portion of the study. Researchers contacted all volunteers who completed a packet to arrange a convenient time for the follow-up lab portion of the study. One hundred and five participants ranging from 17 to 45 years of age subsequently completed the laboratory portion of the study (mean age = 21.80 years; female n = 52; male n = 48). Students who were unavailable for the second portion of the study did not receive the aforementioned stipend or extra credit points. Five students who completed both portions were excluded from the current analysis because of incomplete questionnaire data. Experimenters quasi-randomly assigned participants to success or failure conditions alternating based on the previous condition assignment. The University of Victoria ethics committee approved this study and all procedures were in accordance with APA's code of ethical conduct (Sales & Folkman, 2000).

Design

The design of the experiment was a within and between-group design. Participants were quasi-randomly assigned success and failure groups. The two treatment groups were balanced for sex (success: male = 21, female = 29; failure: male = 27, female = 23). The design incorporated multi-methodism (Cook, 1985) by combining self-report questionnaires, an emotional Stroop task to measure changes in attention, and a word recall question.

Measures

An emotional Stroop task was used as the dependent variable assessing changes in attention following the induction of perceived success or failure. I propose that enhanced attention to threatening words indicates a lapse in emotion regulation. If students were able to regulate the effects of the experience, then there should be few changes in attention to emotional words following the emotional experience. The self-report questionnaires used as predictor variables included the State-trait Anxiety Index (STAI form Y-2; Speilberger, Gorusch, & Luschene, 1969), Fear of Negative Evaluation questionnaire (Watson & Friend, 1969), and Coping Operations Preference Enquiry (Carver, 1997). Questionnaires were selected to measure each part of Gross' definition of emotion regulation (Gross, 1998).

Self-Report Questionnaires

Anxiety. The trait version of the State-Trait Anxiety Index (STAI form Y-2; Speilberger, et al., 1969) is a 20-item self-report scale designed to assess general anxiety-proneness. Participants respond on a 4-point likert scale to 10-positive and 10-negative statements describing the extent to which they "generally feel" a given way (e.g. "I feel

pleasant" and "I feel inadequate"). The STAI-trait has strong internal consistency ranging from .83 to .92 as well as strong concurrent validity (.75 to .80) with other measures of anxiety. The trait anxiety items also show a median corrected item-scale correlation of .59 (Ramanaiah, Franzen, & Schill, 1983).

Evaluation. The Fear of Negative Evaluation Questionnaire (FNE; Watson & Friend, 1969) assesses respondents' fear of evaluation from others. This 30-item true or false questionnaire is an indicator of the extent to which respondents are apprehensive of losing social approval through negative evaluation. Scores range from 0 to 30 with higher scores indicating individuals who are more concerned with others' impressions and more sensitive to criticism. From the original series of 3 experiments on 385 undergraduate students Watson and Friend (1969) found the average item to total correlation to be .72, the internal consistency correlation using the Kuder-Richardson formula 20 to be .94, and the 1-month test-retest correlation as calculated from a separate sample of 29 subjects to be .78 (Corcoran & Fischer, 1987).

Coping. The most recent brief version of the Coping Operations Preference Enquiry (COPE) asks respondents to indicate on a 4-point likert scale how they generally respond to stressful events. COPE, unlike empirically derived measures of coping, builds on coping strategies that have an explicit basis in theory (Carver, Scheier, & Weintraub, 1989). Some of these strategies are expected to be dysfunctional and others to be functional. In samples of college students, Carver et al. (1989) found each COPE subscale to have strong psychometric properties with alphas ranging from .45 to .92. The full COPE is a 60-item measure of 15 unique subscales of coping. From the same sample Carver et al. reported that subscale retest reliabilities range from .46 to .86. The Brief-

COPE is derived from the full COPE based on factor analyses loadings; by only including items with high factor loadings the measure is shorter and less redundant (Carver, 1997).

Stroop Instrumentation

Emotional Stroop. I used an emotional Stroop task to detect participants' prolonged attention to words representing expertise, concern, threat, or focus after the induced failure or success. If the word meaning is significant to participants and their scores indicate low emotion regulation I expect a delay in colour naming. This delay reflects distraction from the simple colour-naming task and enhanced attention to the word.

Apparatus. The task was run on a 486 computer with Pentium processor that is equipped with dual video cards, dual monitors, and an internal timing system. During the emotional Stroop task participants faced a 12-inch CRT computer screen on which the words were presented and wore a hands-free microphone (Realistic #33-2050). The researcher sat on the opposite side of the table facing a second monitor. This monitor displayed the participant's stimulus and required the researcher to record the accuracy of the timing trigger and of the colour response.

Word Lists. Using "The Personal Stroop" (TPS) software developed by Cole, Martin, & Honkanen (1993), the researcher presented a randomized list of 49 target words and 49 control words (98 total) during each Stroop trial. Target words relevant to this study represent self-evaluative words and affectivity words of both positive and negative valence. Each target word had a control word matched for English language frequency, number of syllables, and number of letters (Please see Appendix C for exact

word lists). TPS randomized the colour of the word (red, blue, green, or yellow) and rotated through 10 randomized word lists to ensure that only 10 subjects received the same word list. Additionally, TPS re-queued any responses that the experimenter recorded as invalid (either an incorrect trigger or colour response) and presented these words again at the end of the list.

Procedure

Session I – Questionnaire Packets

At time of recruitment, students obtained a packet of questionnaires to complete at home and return. With the exception of the Ethics form, Contact Sheet, and Demographics Questionnaire, which were respectively the first and last pages in the packet, the questionnaires were randomly ordered. The researcher stressed to students the importance of fully understanding the consent form and of not putting identifying marks on the questionnaires. The researchers assigned identification numbers to all students who completed and returned a packet. Volunteers were contacted by email to set up the in-lab portion of the study.

Session II – In the Lab

Each laboratory session involved a researcher and one participant and required approximately one hour to complete. The researcher provided the participant with an overview of the session which included completion of two computer tasks, some questionnaires, debriefing, and time for questions. As required for the larger study, participants also completed the Positive Affect Negative Affect Schedule (Watson, D., Clark, L.A., & Tellegen, A., 1988) and STAI-state (form Y-1; Speilberger, Gorusch, & Luschene, 1969) at the start of the lab session and again after the emotion induction;

however, that data does not pertain to the current analysis. Participants were reminded that they could withdraw from the study at any time without penalty. If participants wanted to continue, they completed another consent form which served as their copy.

After seating the participant in front of the emotional Stroop monitor, the researcher asked the participant to put on the hands-free microphone and helped with adjustment if necessary. The participant and researcher were seated on opposite sides of the table so that they could not see the other's monitor. Once the microphone was adjusted properly, the researcher explained that words written in various colours would be shown on the screen and that the task was to name the colour the word was written in. There was a minimum of three practice trials so that the participant could get used to naming the word colour as opposed to reading the word. The emotional Stroop task presented both target and control words and took about 15 minutes to complete.

For each emotional Stroop word the researcher recorded (a) if the microphone was correctly triggered and (b) if the colour was correctly named. If either of these standards was not met the researcher indicated as such and TPS automatically re-queued the word.

There was a short break between the first emotional-Stroop task and the maze task so that the researcher could completely shut down the Stroop task and start-up the maze task. The experimental conditions were programmed using the editing level of the UnReal® program. Participants were randomly assigned to a condition when they arrive for the lab session alternating between success and failure. The program was run on a 486 computer with Pentium processor, dual video card, and monitor. Speakers were attached

to the computer and provided simple sound effects such as footsteps and doors opening as the participant moved around the room.

The participant was told "this next part of the experiment is like a computer game that allows us to measure your memory for spatial location. You will use this joystick to walk around the room you see on the screen. There is a specific location in the room that is marked by a green spot. You will have to find and remember this location. Your goal is to find the location as fast as you can each time you enter the room." The participant had three practice trials to become familiar with the room, the joystick, and the target location (which remained in the same location throughout the experiment). There were seven experimental trials during which the green spot was not visible. This meant that the participant had to rely on visual environmental cues to find the target location. The participant was allowed 40-seconds to find the target location as timed by the researcher. When participants correctly found the target location, the green spot appeared like a platform signaling a successful trial.

The level of precision required to trigger the appearance of the target location was different between conditions. In the success condition the target area was quite large in diameter. Participants triggered the appearance of the green spot once they entered any portion of the target circumference. Participants in this success condition were informed that they scored in the top 7.3%. In the failure condition the target location was quite small in diameter. As such, participants had to locate the target much more precisely in order to trigger the appearance of the green spot. Moreover, the last 3 trials in the failure condition were impossible trials (it was impossible to trigger the location). Participants in

this failure condition were informed that they scored in the bottom 30%. Completion of either the success or failure condition took about 15 minutes.

Directly following the maze task the researcher turned off the Maze program and start up the emotional-Stroop again. The participant received the same emotional Stroop word list (same order of words presented in randomly different colours) as the first trial.

The participant put on the headset and the researcher adjusted the microphone again. The researcher then informed the participant that "We're going to run through the three practice trials really quickly and then the whole word list again. Remember you are just naming the colour of the word." The second emotional Stroop task took 15 minutes to complete. Participants were asked if they had ever done a task like the emotional Stroop task, and if so when or where. Finally, participants recalled any words that they remembered from the emotional Stroop task

At this point the experiment ended, and the debriefing began. The researcher asked if the participant had any questions. Then the researcher explained the emotional Stroop task, the manipulations used during the maze task, and the intentions behind the manipulations. Once again, participants were asked if they had any questions, comments, or suggestions regarding the study. Before departing, participants received their copy of the consent form and their $5 stipend or extra credit confirmation form. Participants were reminded to not discuss the study with other members of their class.

Analysis

Preliminary Analyses

Descriptive statistics for both raw and standardized FNE, COPE, and STAI-trait scores were computed. The means and ranges of the raw scores are as follows: COPE:

min = 60, max = 98, M = 80.30; FNE: min = 0, max = 30, M = 12.78; and STAI-trait: min = 33, max = 55, M = 41.91.

The distributions of raw scores for each questionnaire are displayed in Figure 1 (COPE), Figure 2 (FNE), and Figure 3 (STAI-trait). All scores are normally distributed indicate minimal differences between "high emotion regulators" and "low emotion regulators."

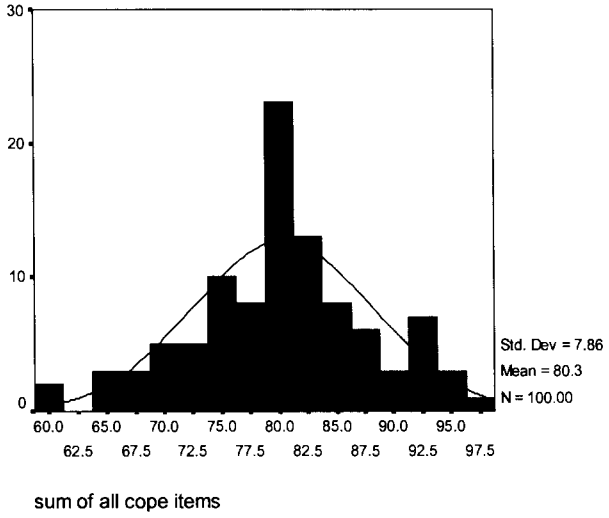

Figure 1: Distribution of raw responses on Coping Operations Preference Enquiry

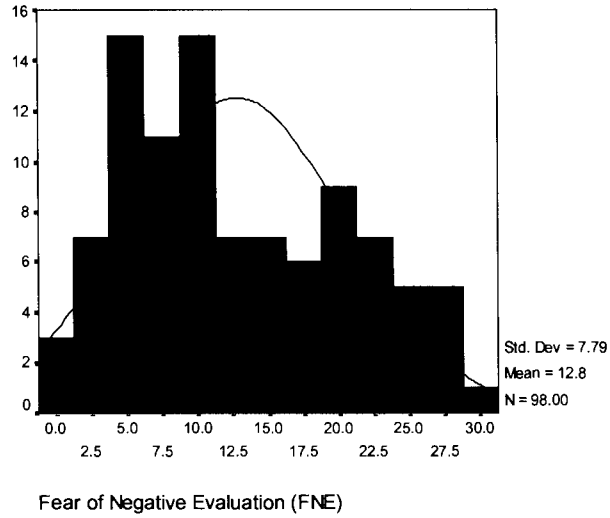

Figure 2: Distribution of raw responses on Fear of Negative Evaluation

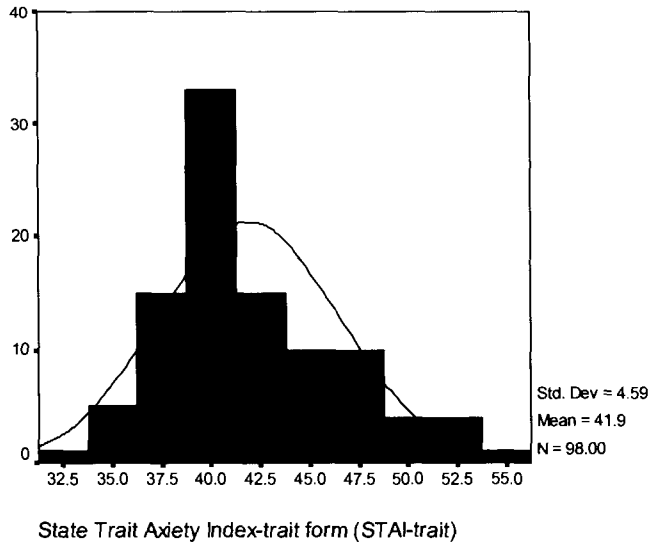

Figure 3: Distribution of raw responses on State-trait Anxiety Index, trait version

Descriptive statistics for standardized questionnaires divided by group are presented in Table 2.

Table 2: Standardized Questionnaire Descriptive Statistics

	Success			Failure		
Measure (standardized)	M (StdDev)	Min	Max	M (StdDev)	Min	Max
Questionnaire measuring three aspects of Gross' definition of Emotion Regulation						
FNE (when)	-.41 (17.39)	-27.16	31.70	-.63 (15.28)	-25.28	36.58
COPE (how)	.25 (8.66)	-18.84	19.51	.25 (9.44)	-25.10	16.61
STAI-trait (which)	.04 (12.21)	-18.01	36.89	.33 (12.92)	-17.88	32.75

* All means were standardized to allow comparisons between variables. N listwise = 89.

A check on the quasi-random assignment (alternating assignment) of participants to either the success or failure condition found that the two groups had statistically equivalent means on the FNE, COPE, and STAI-trait prior to the success and failure manipulations. (FNE $t(96) = .07$, $p > .05$; COPE $t(98) = .28$, $p > .05$; and STAI-trait $t(91)$

= -.11, $p > .05$). Similarly, no significant gender differences were found on pre-manipulation FNE, COPE, and STAI-trait scores.

Emotional Stroop response times were checked by syntax written by the researcher and outliers removed. Outliers were defined as colour-naming latencies less than 300 ms or greater than 3000 ms which were set to missing.It is generally accepted that valid Stroop response times fall within this range (Segal, Gemar, Truchon, Guirguis, & Horowitz, 1995).

Factor Analysis

Three sets of factor analyses were run to extract statistically parsimonious and meaningful factors. I will describe the results of this factor analysis below; however, the resulting factors were not included in subsequent analyses since they failed to produce a clear pattern or meaningfulness. The factor analyses were performed on the raw difference scores between the target and control words from the first administration of the emotional Stroop ($T1stroop_{target}$ - $T1stroop_{control}$). All factor analyses used principal component analyses with oblimin rotations and Kaiser Normalization.

Retaining all factors with eigenvalues greater than 1 produced a nine factor solution. However, these nine factors did not show a clear pattern of meaning; they accounted for only 34.5% of the variance. A scree plot revealed a sharp reduction in eigenvalues for the first four factors and then a gradual leveling off for the other factors. This four-factor pattern was consistent with original division of words into four categories. Based on these three pieces of information a second factor analysis was conducted retaining only four factors.

The four factors solution accounted for 34.49% of the total variance among items, with each factor accounting for 9.9%, 9.4%, 8.2% and 7.0% respectively of the variance. From the pattern matrix the words stupid, slow, lost, and relaxed did not load significantly on any factor.

A final factor analysis was performed without the words stupid, slow, lost, and relaxed. The four factors solution accounted for 39.34% of the total variance among the items, with each factor accounting for 11.1%, 10.9%, 9.4%, and 7.9% respectively of the variance. Any factor after this elimination valued less than ±.40 was assigned to its highest loading category. The final word categories produced by the factor analyses were as follows:

Table 3: Extracted Factors and Loading Values

Factor A		Factor B		Factor C		Factor D	
Word	Value	Word	Value	Word	Value	Word	Value
Wrong	.64	Quit	-.60	Give up	.50	Failure	-.44
Aced it	.48	Dumb	-.57	Found it	.44	Brainy	-.54
Feel Good	.50	Intelligent	-.75	Hate this	-.72	Smart	-.65
Scared	.51	Angry	-.50	Mad	.50	Happy	.41
Panic	.70	Hopeless	-.45	Hopeful	-.46	Anxious	.55
						Frustrate	.34

No apparent overarching theme seems to unify and cohesively sum up each category. In particular it is interesting that negative and positive valence words are included in the same category with the same sign. Overall the factor analysis showed that at T1 participants' responses were not differentiated on the basis of word category or valence. As such, all following analyses are conducting using the original emotional Stroop word categories (see Appendix B).

The raw mean response times for the original word categories within group and gender are reported in Table 4 and Table 5.

Table 4: Mean Raw Stroop Response Times (ms) for Success Group

		Mean Raw Stroop Latency Scores for Success Group		
	Stroop Word Domain	Mean T1: pre manipulation (StdDev)	Mean T2: post manipulation (StdDev)	Mean Difference Score T2-T1 (StdDev)
Female				
	Self-evaluative Negative	671.15 (90.1)	702.47 (175.3)	31.32 (115.2)
	Self-evaluative Positive	696.97 (95.3)	709.08 (136.2)	12.11 (108.1)
	Affect Negative	695.15 (115.5)	673.51 (124.7)	-21.64 (90.8)
	Affect Positive	687.28 (96.6)	692.47 (126.7)	5.19 (89.5)
	Control	704.38 (118.6)	697.75 (116.1)	-6.85 (50.4)
Male				
	Self-evaluative Negative	651.51 (124.7)	652.75 (102.6)	1.24 (72.83)
	Self-evaluative Positive	661.30 (99.1)	687.34 (124.8)	26.05 (108.50)
	Affect Negative	661.93 (144.3)	646.73 (100.5)	-15.19 (105.34)
	Affect Positive	638.51 (129.0)	601.94 (96.2)	-36.57 (100.24)
	Control	657.78 (87.0)	639.78 (83.3)	-21.63 (74.42)
Total				
	Self-evaluative Negative	662.90 (105.2)	681.59 (149.9)	18.69 (99.85)
	Self-evaluative Positive	681.99 (97.5)	699.95 (130.6)	17.96 (107.39)
	Affect Negative	681.19 (128.0)	662.27 (114.8)	-18.93 (96.20)
	Affect Positive	666.80 (112.8)	654.45 (122.4)	-12.35 (95.44)
	Control	684.81 (108.0)	673.41 (106.6)	-13.06 (61.38)

Table 5: Mean Raw Stroop Response Times (ms) for Failure Group

		Mean Raw Stroop Latency Scores for Failure Group		
	Stroop Word Domain	Mean T1: pre manipulation	Mean T2: post manipulation	Mean Difference Score T2-T1 (StdDev)
Female				
	Self-evaluative Negative	646.90 (103.8)	633.14 (95.4)	-13.77 (55.20)
	Self-evaluative Positive	672.77 (135.5)	668.37 (94.0)	-4.40 (90.08)
	Affect Negative	653.23 (99.9)	657.95 (95.7)	4.72 (71.39)
	Affect Positive	650.21 (149.7)	634.83 (96.6)	-15.38 (133.77)
	Control	667.70 (97.6)	650.68 (98.4)	-16.96 (34.89)
Male				
	Self-evaluative Negative	603.26 (111.1)	616.54 (104.0)	13.28 (51.67)
	Self-evaluative Positive	619.38 (107.8)	625.56 (113.7)	6.18 (63.38)
	Affect Negative	613.55 (112.1)	630.40 (122.6)	16.86 (87.25)
	Affect Positive	591.55 (112.4)	618.60 (115.1)	27.06 (82.61)
	Control	615.66 (94.3)	632.26 (102.9)	16.67 (52.54)
Total				
	Self-evaluative Negative	623.34 (109.0)	624.17 (99.5)	.84 (54.50)
	Self-evaluative Positive	643.94 (123.0)	645.25 (106.3)	1.31 (76.18)
	Affect Negative	631.80 (107.4)	643.07 (110.8)	11.27 (79.78)
	Affect Positive	618.53 (132.8)	626.07 (106.2)	7.54 (110.05)
	Control	639.60 (98.4)	640.73 (100.3)	1.20 (47.94)

All subsequent analyses were conducted with standardized Stroop response times.

Standardized descriptive statistics for the original word categories are shown in Table 6.

Table 6: Descriptive Statistics for Standardized Stroop Difference Scores (T2 – T1)

	Success			Failure		
Measure	M (SE)	Min	Max	M (SE)	Min	Max
Stroop Category Pre-Post Difference Scores (T2 – T1) standardized means						
Self-evaluative Negative	.17 (.08)	-1.26	2.27	-.17 (.05)	-1.12	.57
Self-evaluative Positive	.16 (.09)	-.84	2.42	-.16 (.07)	-1.66	.66
Affect Negative	.06 (.08)	-1.68	1.25	-.06 (.08)	-1.48	1.16
Affect Positive	.08 (.09)	-1.60	1.86	-.08 (.07)	-1.35	1.14
Control	.00 (.05)	-.94	.55	-.12 (.07)	-1.31	.93

*All means were standardized to allow comparisons between variables. N = 100.

Regression Analyses

Multiple regression of the emotional Stroop change scores onto the standardized questionnaire scores was performed for each category of emotional Stroop words. Listwise deletion across word categories was used. Each regression was performed by regressing standardized Stroop difference scores (Stroop $T2_{target}$ – Stroop $T1_{target}$) onto group (success or failure), measures of anxiety (STAI-trait), fear of negative evaluation (FNE), coping strategies (COPE), and the interactions between these factors and group. Interaction terms were created using the standardized means of the STAI-trait, FNE, and COPE with group. Gender was only a significant predictor of affective positive words. Gender was retained in the analysis of affective positive words but dropped from the remaining analyses. Interaction terms were not significant for any of the five word group analyses and were dropped from the final analyses. Results are presented in Table 7.

Table 7: Regression of word category Stroop effects onto group, FNE, STAI-trait, and COPE.

Variables	B	SE(B)	ß	T	R^2
Dependent Variable: Pre-post difference scores for negative self-evaluative words					
Group	-.28	.10	-.29	-2.82**	.09
Fear of Negative Evaluation (FNE)	.00	.00	.01	.05	
State-trait Anxiety Index (STAI-trait)	-.00	.01	-.03	-.19	
Coping Operations Preference Enquiry (COPE)	.00	.01	.03	.27	
Dependent Variable: Pre-post difference scores for positive self-evaluative words					
Group	-.25	.11	-.23	-2.28*	.09
Fear of Negative Evaluation (FNE)	.01	.00	.21	1.70	
State-trait Anxiety Index (STAI-trait)	-.01	.01	-.15	-1.15	
Coping Operations Preference Enquiry (COPE)	.00	.01	.05	.48	
Dependent Variable: Pre-post difference scores for negative affective words					
Group	-.13	.12	-.11	-1.06	.03
Fear of Negative Evaluation (FNE)	-.00	.00	-.12	-.91	
State-trait Anxiety Index (STAI-trait)	.00	.01	.06	.40	
Coping Operations Preference Enquiry(COPE)	.00	.01	.05	.47	
Dependent Variable: Pre-post difference scores for positive affective words					
Group	-.14	.12	-.12	-1.15	.15
Gender	.43	.13	.36	3.26**	
Fear of Negative Evaluation (FNE)	-.00	.01	-.09	-.69	
State-trait Anxiety Index (STAI-trait)	.01	.01	.12	.92	
Coping Operations Preference Enquiry (COPE)	.00	.01	.01	.12	
Dependent Variable: Pre-post difference scores for control words					
Group	-.02	.07	-.03	-.30	.03
Fear of Negative Evaluation (FNE)	-.00	.00	-.16	-1.19	
State-trait Anxiety Index (STAI-trait)	.00	.00	-.01	-.09	
Coping Operations Preference Enquiry(COPE)	.00	.00	.05	.45	

*p< .05, **p<.01

Because there were significant gender effects for affective positive words I ran separate regressions for each gender. Results are presented in Table 8.

Table 8: Regression of Affective Positive Stroop words onto the FNE, STAI-trait, and COPE within Gender

Variables	B	SE(B)	ß	T	R^2
Female					
Group	-.34	.16	-.30	-2.08*	.16
Fear of Negative Evaluation (FNE)	.01	.01	.14	.84	
State-trait Anxiety Index (STAI-trait)	.01	.01	.13	.76	
Coping Operations Preference Enquiry (COPE)	.01	.01	.11	.72	
Male					
Group	.16	.16	.15	.99	.17
Fear of Negative Evaluation (FNE)	-.02	.01	-.51	-2.58*	
State-trait Anxiety Index (STAI-trait)	.01	.01	.25	1.20	
Coping Operations Preference Enquiry (COPE)	-.01	.01	-.20	-1.19	

*p<.05

Summary. The results did not support the proposed hypotheses. Group alone was a significant predictor of pre-post change in Stroop response times for words belonging to self-evaluative positive and negative domains. Gender was a significant predictor of Stroop response times for words belonging to the affective positive domain. Separate regression analyses within genders found that pre-post change in female participants' Stroop latencies were predicted by group assignment alone. In contrast, group was not predictive of change in male participants' response times but the FNE was a significant predictor. This is the only condition in which a measure assigned to assess emotion regulation was predictive of change in Stroop colour-naming latencies.

Alternative Analysis

With few significant regression results, an alternative explanation must be considered. Looking back at the raw emotional Stroop scores it seems highly possible that there is no significant difference between emotional Stroop response times for the two administrations of the task. The raw reaction times appear stable over time (refer to Tables 4 and 5). Correlations between the raw emotional Stroop response times for each category of words at each administration of the emotional Stroop list suggest that response times for the two administrations (T1 and T2) are highly correlated. This suggests a high level of consistency over the pre-post time lag of this study. Results are listed in Table 9.

Table 9: Correlations between T1 and T2 for Each Stroop Word Category and Condition

	Success		Failure	
Stroop Word Domain	Female	Male	Female	Male
Self-evaluative Negative	.81	.81	.85	.89
Self-evaluative Positive	.61	.55	75	.84
Affective Negative	.72	.68	.73	.73
Affective Positive	.71	.64	.48	.74

Next, I conducted paired samples *t*-tests for the mean of each category of words to check for statistically significant mean differences between the two Stroop administrations. Results from two-tailed *t*-tests indicate that the changes in mean response times between the two administrations (T1 and T2) of the emotional Stroop task are not significant. These results indicate that there is no significant difference in response times between the two administrations for any category of words.

Table 10: T-tests of the pre-post mean change for each word category within condition and gender

		Success			Failure		
	Stroop Word Domain	t	df	Sig.	t	df	Sig.
Female							
	Self-evaluative Negative	-1.46	28	.15	1.20	22	.24
	Self-evaluative Positive	-.60	28	.55	.23	22	.82
	Affective Negative	1.28	28	.21	-.32	22	.75
	Affective Positive	-.31	28	.76	.55	22	.59
Male							
	Self-evaluative Negative	-.08	20	.94	-1.33	26	.19
	Self-evaluative Positive	-1.10	20	.28	-.51	26	.62
	Affective Negative	.66	20	.52	-1.00	26	.33
	Affective Positive	1.67	20	.11	-1.70	26	.10

The words involved in this study were lumped into categories. This means that the individual impact of a word may have been lessened by its categorical inclusion. In other words, if four words in a category show no effect but one does, the effect on that one word may be overlooked because of the contributions of the non-significant words within the category. As such, I ran individual *t*-tests on each word ($Stroop_{targetT2} - Stroop_{targetT1}$). At this individual word level only four words demonstrated statistically significant pre-post differences: hopeless, slow, hate this, mad.

Discussion

Emotional Stroop latencies for positive and negative self-evaluative words were predicted by group. For female participants group predicted emotional Stroop latencies for positive affect words; for male participants fear of negative evaluation predicted emotional Stroop latencies for positive affect words. No independent variable predicted emotional Stroop latencies for negative affective words. The factor analysis did not create

meaningful factors which may be consistent with the fact that a normative sample as opposed to a clinical sample was used in the current study. At the first Stroop administration (T1) participants' responses should not be influenced by word category or valence because concern, vigilance, or expertise (Williams, Mathews & McCleod, 1996) has not been induced. Following the emotional induction I expected individual differences in emotional reaction to a particular category of words. While participants may have slightly differential responding for target words based on pre-existing emotional sets, there is no expectation that their initial responses would match the categorical patterns predetermined to reflect the success or failure task.

The lack of consistent regression results has several possible explanations. First, the manipulation task may not have been strong enough to trigger an emotional reaction to the Stroop words. Or, the emotional Stroop words may not have sufficiently captured the participants' feelings.

Group emerged as a significant predictor for words in both the positive and negative self-evaluative domains. It is interesting that the direction of the relationship does not differ between positive and negative valence words; both were negatively related to change in emotional Stroop latencies. Participants in the success group responded more slowly to both positive and negative self-evaluative words than did participants in the failure group. Success seemed to trigger self-evaluative concern, threat, or expertise for participants on both positive and negative words; whereas, failure on this particular task did not seem to signal concern, threat, or expertise. It is possible that the nature of the experimental task allowed students to dismiss the failure as

insignificant and unthreatening therefore not warranting self-evaluation; while, success appears to have triggered attention to both positive and negative self-evaluative words.

The significant group effect suggests that the success and failure manipulation effectively produced differential responding for self-evaluative words. This finding supports studies that show changes in the strength of a Stroop effect when an intervening stimulus is presented. For example, alcoholic participants have longer Stroop latencies for alcohol related words when an alcoholic beverage is in close proximity (Cox, Brown, & Rowlands, 2003; Sayette, Monti, Rohsenow, Gulliver, 1994). This suggests that under the correct conditions, concern and threat can be evoked quite quickly and long term experience with, or rumination on, the threat or concern is not always necessary.

No independent variables predicted response times for negative affective words. This is consistent with other research that finds Stroop interference is substantially less robust for general emotional words than it is for words specific to a condition. For example, in Watts et al.'s (1986) study on spider phobia, they found significant Stroop interference for "spider" and "web" but not for generally negative words such as "fail." Similarly, Mogg, Mathews, Bird, and MacGregor-Morris (1990) administered an emotional Stroop task with emotionally negative words (i.e. lonely) and achievement threat words (i.e. ignorant) to high and low trait-anxious participants following a manipulated failure experience. They found emotional Stroop interference was greater for achievement based words than for emotional words. The finding for negative affect words in the current study supports extant literature suggesting it is more difficult to generate emotional Stroop interference for purely emotional words than for words that name a specific concern, threat, or expertise.

In contrast, gender emerged as a significant positive predictor of words in the positive affective domain indicating that women in general took longer to respond to positive affective words. This gender difference may be explained by the fact that participants were told that the task was a measure of spatial ability, a task on which female performance is stereotypically not as strong as male performance (Weiss, Kemmler & Deisenhammer, 2003). This gender difference is particularly evident when time restrictions are placed on visual spatial task as was done in the current study (Weiss, Kemmler & Deisenhammer, 2003). The very nature of the cover story for the task may make female participants more uncertain and male participants more certain of their performance ability (Goldstein & Chance, 1965).

More specifically, female participants' attention to positive affective words was negatively related to their group assignment such that women in the success condition had statistically significantly longer response times than those in the failure group. Perhaps, female participants who succeeded were pleasantly surprised at beating the stereotype and therefore more sensitive to the positive affective words as evidenced by longer Stroop response latency. In contrast, female participants who received failure feedback may have been unsurprised by the failure and therefore prepared to regulate emotions. This suggests women were able to regulate *expected* emotions. This is consistent with Gross' concept of reappraisal: female participants decided that it was just a game of spatial location and if they stereotypically believed that they were not good at spatial location it was easy to dismiss emotions.

For men fear of negative evaluation (FNE), instead of group, was a significant negative predictor for male Stroop response scores on affective positive words. This is

the only occasion that any of the emotional regulation measures were significant. Men who reported low levels of fear of evaluation, independent of group assignment, had statistically significantly longer Stroop latencies for positive affect words than those who reported higher levels of fear.

This finding may be supported by existing evidence on mood-congruent and mood-incongruent findings with the emotional Stroop task (Gilboa-Schechtman, Revelle, & Gotlib, 2000). Reports of low fear of negative evaluation should be congruent with a more positive mood therefore making it easy to ignore negative stimuli and dedicate attention to positive, mood-congruent, affective words. Stated earlier, men endorse the stereotype that they are better at visual spatial tasks than women as evidenced by self-reported skill and confidence (Weiss, Kemmler, & Deisenhammer, 2003). This stereotype may strengthen the argument that men who self disclose low levels of fear of negative evaluation do not fear the task and therefore show increased attention to positive affective words. Indeed, they report few fears and in turn dedicate attention to positive stimuli.

Self-reported high levels of fear of negative evaluation, on the other hand, are incongruent with positive mood and therefore clash with positive affect words. Endorsing the stereotype (Weiss, Kemmler & Deisenhammer, 2003) may increases the initial performance expectation for male participants. As a result, men who already report high levels of fear of evaluation may feel the pressure of having more "on the line" and therefore be too otherwise absorbed to attend to positive affective stimuli. These male participants may be so preoccupied by fear that they are unable to attend to positive affect words; it is as if positive affective words do not even register for these men.

Unfortunately, it is difficult to make any other assertions regarding emotion regulation since the measures used to assess the components of emotion regulation were not otherwise predictive of any emotional Stroop response times. It is possible that the normalcy of the sample in regards to the measures created a restriction of range for good or bad "emotion regulators" thus not allowing the effects of emotion regulation to be seen.

Limitations of the Study

Power and effect size. The power and effect sizes of this study could have been improved by pre-testing a large sample of students on the measures of emotion regulation and then selecting those who displayed the highest and lowest levels of emotional regulation. This would exaggerate the differences between high and low emotion regulators and might lead to cleaner results. The current study did not have the resources available to engage in such a rigorous pre-testing protocol.

Meaningfulness of the manipulation. There were several aspects of the design of our manipulation task that may have weakened its effect. First, because the task needed to be ethically acceptable the strength of negative feedback and the frustration induction were quite limited. Second, the manipulation needed to be completed in a relatively short time frame and look identical in both success and failure conditions, while at the same time inducing believable failure or success feedback. The computer maze task fulfilled these requirements and was also reasonably entertaining and engaging for participants. The manipulation seemed to induce feelings of success or frustration in each respective condition (based on participants self-reports during the debriefing session); yet, the question of whether the manipulation was sufficiently meaningful to the participants to

generate a meaningful emotional response still remains. The cover story that the task measured spatial ability was intended to increase the meaningfulness of the task to the participant. However, this story may also have generated stereotypical gender performance expectations (Weiss, Kemmler & Deisenhammer, 2003). Perhaps a more obviously meaningful task, a task more specifically related to academic work, and a less-gender sensitive task might yield different results.

Selection of measures to indicate emotion regulation. There was no single measure of emotion regulation suitable for use in this study. The COPE, FNE, and STAI-trait may have been too general to assess the individual components of Gross' definition of emotion regulation. These are well recognized and validated measures of coping, fear of evaluation, and anxiety but they are global rather than domain specific in nature. They are also not directly related to emotional experience. Perhaps these measures were unable to provide a picture of a student's emotion regulation tendencies and were therefore not predictive of emotional Stroop response times.

Use of the emotional Stroop. The current study used the emotional Stroop task in three novel ways: (a) with two administrations of the emotional Stroop task within the same experimental condition, (b) with a normal sample of university students, and (c) following an induced emotional experience. Under these three conditions the emotional Stroop task could not successfully detect differences between word categories in the current study. It is possible that the word selection did not tap into the emotions that participants experienced. Previous studies also report that it is difficult to get a Stroop effect for global emotional words that are not situation specific. Results are much stronger for words that represent the cause of the emotion than for words that label the

emotion itself. These are nuances of the emotional Stroop task that warrant further investigation (Watts et al., 1986; Mogg et al., 1990).

Appropriate selection of Stroop words is essential to evoke an emotional Stroop effect. By using a normal sample of university students and an induced emotional task it was difficult to predict which words would be emotionally salient for participants. Although the words were selected based on peer and researcher reports of emotions experienced during the task there was no guarantee that participants would share these feelings.

Control group. This study did not include a separate control group. However, care was taken to control as many factors as possible. For example, each participant served as his or her own within-subject control since all analyses were conducted using pre-post difference scores. Each participant received the same word list (in the same order) to control for fatigue effects of words presented later in the list; however, the colour in which the word was presented was randomly assigned by the computer to dissuade participants from "guessing" or "remembering" the first colour presentation. To control for overall order effects, 10 randomly ordered word lists were created. This meant that only 10% of participants received the same word list. To ensure that approximately the same amount of time elapsed between the two administrations of the emotional Stroop task, the success and failure manipulation tasks required the same amount of time to complete.

Conclusions and directions for future research

Measurement. Two issues regarding measurement must be addressed in future studies. First, a more comprehensive and sensitive measure of emotion regulation needs

to be established. Emotion regulation may not be a concept that can be adequately measured by common self-report forms. Although Gross' definition of emotion regulation is well presented, it seems unlikely that its components will be adequately assessed by the questionnaires that are currently available. Future research must begin by investigating ways to assess emotion regulation and then extend to use that measure in experimental designs.

The emotional Stroop is also a measure that receives mixed support when used with a normal sample. Similar studies could be conducted with a more traditional pen-and-paper measure of emotional change following the manipulation instead of the emotional Stroop. This would help determine if the lack of results is primarily related to the emotional Stroop task or the measures used to assess emotion regulation. The emotional Stroop has proven to be a good measure of general levels of emotional arousal in clinical samples; however, it is less robust and inconsistent findings appear when the emotional Stroop task is used with normal population (see Williams et al., 1996; Gilboa-Schechtman et al., 2000). There are essentially no studies that resemble the current study's dual administration of the emotional Stroop with both a normal sample and an experimental manipulation task. These design facts complicated the process of determining which words would generate a Stroop effect. More information must be accumulated on the emotional Stroop both with normal populations and with experimental manipulations. Current evidence suggests that the emotional Stroop task will be useful in these ways but more details regarding protocol, delay between administrations, and word selection must be amassed.

Theoretical Directions. Perhaps from a theoretical perspective the effects of emotion regulation are embedded within an additional framework. Future research needs to look at linking emotion regulation with well established theories such as attribution (Weiner, 1985), goal theory (Meyer & Turner, 2002), and self-regulation (Zimmerman, 1989). The scope of the current study was not able to incorporate these other theoretical frameworks. However, future studies should investigate the possibility that emotion regulation is subsumed by these larger theories.

Future research should consider the personal interpretation of the feedback scores. Given that neither group nor gender was a significant predictor across all conditions and word categories, it is possible that some participants may have interpreted the success feedback as subjective failure or the failure feedback as a personal success. Future research should try to ensure that the values arbitrarily assigned for success and failure are interpreted as such by participants.

Conclusion. The current study used the emotional Stroop task to investigate how emotional experiences of success or failure may interfere with university undergraduate students' attention. Results show that experimental group (i.e. success or failure) predicted emotional Stroop response latencies for positive and negative self-evaluative words. Group also predicted female responses to positive affective words; while, fear of negative evaluation predicted male responses to positive affective words. Future research must consider methodological issues pertaining to measuring emotion regulation and using the emotional Stroop task with a university sample as well as theoretical discrepancies in the definition of emotion regulation and its framework.

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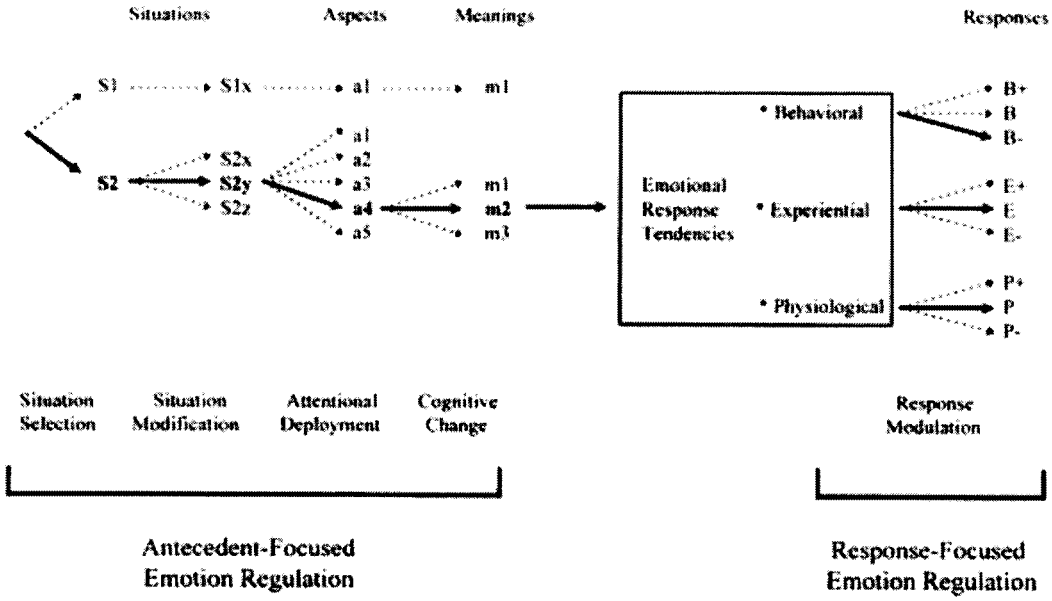
Appendix A: Process Model of Emotion Regulation (Gross, 1998, p.282)



Appendix B: Word Lists

target	control	
hopeless	goodness	self-evaluative negative
quit	quiet	
give up	grow up	
dumb	crumb	
stupid	stable	
slow	clean	
lost	cost	
failure	sailing	
wrong	wrote	
brainy	grainy	self-evaluative positive
smart	spare	
intelligent	integrated	
aced it	ate it	
found it	fold it	
relaxed	garment	affective positive
hopeful	watchful	
happy	human	
feel good	feel new	
scared	draws	affective negative
panic	piano	
anxious	apple	
frustrate	function	
hate this	ate this	
mad	lad	
angry	angle	