

Stress Reappraisal and its Effects on Emotional Bias,  
State Anxiety, Social Performance  
and Physiological Measurements

by

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## **Abstract**

Many individuals will struggle with performance anxiety throughout their life. Clinical research has shown that a positive conceptualization of stress and stress arousal (stress reappraisal) can lead to positive outcomes such as increased cardiac efficiency, higher GRE test scores and decreased bias towards threat cues as measured by physiological, performance, and attentional bias measures in a clinical population. Little is known regarding these processes in non-clinical populations. As such, this study examined the effects of different conceptualizations of stress (positive, negative, and neutral) on blood pressure (mean arterial pressure), social performance ratings, and emotional bias via physiological, observational, self-report, and attentional bias measures within a non-clinical population. In this study, participants who were instructed to conceptualize stress as positive had significantly lower mean arterial pressure (MAP) during a stressful task and significantly higher social performance during a social evaluation task in comparison to participants who were instructed to conceptualize stress as negative. This research suggests that a positive conceptualization of stress might improve cardiac function and performance on certain tasks in a non-clinical sample. Implications from this research suggest that if one who perceives stress and stress arousal as beneficial may experience an increase in their performance during a social evaluation situation, a decrease in the negative effects of stress arousal on physiology, and a positive impact on stress arousal responses.

## **Stress Reappraisal and its Effects on Emotional Bias, State Anxiety, Social Performance and Physiological Measurements**

Regardless of whether one fits the criteria for social anxiety, performance anxiety is an issue faced by many students, performers, and employees of various kinds. Models of abnormality suggest that the ways in which people process or conceptualize information when faced with a stressful event may lead to the development of mental illness (Beck & Dazois, 2011). It is also believed that the inability to regulate, attribute, and understand one's emotions, such as fear or shame, may also lead to mental disorders, such as performance anxiety (Gross, 2008). The current literature regarding stress and stress arousal suggests that there are different types of stress and that when stress is conceptualized positively, improvements in physical well-being are observed. What the previous research fails to address is improvements in one's mental health in a non-clinical sample when using the Trier Social Stress Test Paradigm. It also lacks detailed evidence on how positive emotions may be related to previous results. In accordance with the literature, a positive conceptualization of stress can be a tool or a preventative measure that can help individuals cope with stress, which may lead to a better outlook on life and a better quality of life. The present study seeks to examine possible implications of using a stress reappraisal intervention (a Cognitive Behavioural Therapy technique) for coping with performance anxiety and anxiety in general within a non-clinical population. The present study also seeks to examine if when individuals conceptualize stress and stress arousal in a positive way, improvements in their mental health and more specifically performance anxiety can be determined. This was achieved by attempting to change a typical negatively biased cognitive schema on stress and stress arousal. This study may lead to further research in how stress reappraisal intervention may be a factor in the prevention of mental illnesses that are heavily

influenced by distress and emotional information. This study may also show how stress reappraisal interventions change emotional affect through verbal instructions and help individual experience with performance anxiety.

### *Social Anxiety Disorder/Performance Anxiety*

According to the Diagnostic and Statistical Manual of Mental Disorders Fifth Edition (DSM 5), Social Anxiety Disorder (formerly Social Phobia) with a performance anxiety specifier is an intense fear of social situations, where the individuals may be judged negatively by others, and specifically when giving a performance (stage fright). Individuals with this diagnosis also fear that they will display symptoms of their anxiety such as trembling or sweating, which could lead to embarrassment during a performance. Embarrassment is an emotional state and is categorized as a self-conscious complex emotion; it is not an automatic emotion such as fear, but requires self-evaluation. Individuals may also experience anticipatory anxiety; this is defined as worrying about an event prior to exposure. Individuals may completely avoid performance events that induce anxiety, such as an oral presentation or a public speaking engagement (American Psychiatric Association, 2013). Anxiety is an extension of fear, in that it may be adaptive to feel fear; however, when anxiety becomes excessive, it cripples the individual to the point where it hinders his or her well-being and causes significant distress and/or impairment in daily functioning. Stress is a response to a demand, whereas anxiety is a maladaptive response or reaction to stress or anticipated stress, and a fear of shame. Therefore, how one responds to a demand, and reacts to stress or anticipated stress is subjective and displayed during that current state.

Anxiety in general provokes hyperarousal by means of the sympathetic nervous system, or the fight or flight response. The sympathetic nervous system activates the adrenal glands when



a threat is perceived, which then releases noradrenaline. Noradrenaline creates physiological changes by way of tachycardia (increased heart rate), vasoconstriction, perspiration, and an initial increase in cortisol (stress hormones) to ready the individual to face the challenge. These changes may cloud one's judgment (Dienstbier, 1989). The physiological arousal from a stressful situation accompanies the distressing anxiety. This is apparent in individuals with any anxiety disorder diagnosis who experience an increase in heart rate and sweating when in an anxiety-inducing situation. Such physiological responses can in themselves be distressing and anxiety-inducing for the individual. It is important to note that feelings of anxiety are not merely present in individuals with social anxiety, which is why research on anxiety within a nonclinical population is imperative.

### *The Cognitive Theory of Abnormality*

Aaron Beck first created The Cognitive Theory of Abnormality in 1967 to help diagnose and treat individuals with depression. Since that time, it has been applied to other forms of mental illness, including anxiety disorders. Since its beginning, the field of cognitive therapy and research in cognitive psychology has been growing rapidly. Treatments based on cognitive theories examine the ways in which people process information to adapt to their environment. The aim of such treatments is to teach the patient to think differently. In terms of mental illness, it is believed that dysfunctional beliefs, cognitive distortions (illogical interpretations), emotional events, and memories work in conjunction with behaviours and physiology, to influence how an individual processes new information (Beck & Dazois, 2011). Beck also believes that cognitive schemas "influence the screening, coding, categorization, and interpretation of incoming stimuli" (Beck & Dazois, 2011). A cognitive schema stores information that shapes people's beliefs about situations, the self, and others. In a sense, a schema is an appraisal or conceptualization from

experiences that people use to form concepts about future experiences. Schemas are important especially adapting to a situation or environment (e.g. avoiding an individual that displays aggressive body language). However, when these schemas are maladaptive or negatively biased, mental illnesses begin to emerge. Maladaptive and/or negatively biased schemas create an issue with information processing by affecting one's interpretations and attention (Beck & Dazois, 2011). For example, individuals who are subject to anxiety disorders, may exhibit an attentional bias towards false threat cues. These individuals may also interpret their physiological changes as distressing. Due to these negatively biased schemas, individuals may experience irrational fears, panic, and health anxiety. Therefore, how one interprets a concept (e.g. stress) may affect their behaviour, physiology, emotions, and thinking in future experiences.

### *Cognitive Behavioural Therapy*

Following The Cognitive Model of Abnormality, Beck developed a therapy to help his patients. Cognitive Behavioural Therapy (CBT) is a form of treatment that is based on an individual's specific beliefs (e.g. conceptualizations) and their pattern of behaviour (Beck, 1993). During CBT, emphasis is placed upon changing negative thoughts and maladaptive beliefs into positive thoughts and beliefs that can be deemed as adaptable and rational. Common methods that are used in CBT include; disputing irrational beliefs, changing one's language, and skills training (helping the patient gain coping skills to eliminate self-defeating behaviour). CBT examines emotions, physiology, thoughts, and behaviour as key factors that influence one another during a distressing event. Other related modes of therapy such as Rational Emotive Therapy (RET) have continued to show promise. They hypothesize the same underlying cause for abnormality, which is seen as stemming from irrational thoughts and negative emotions. Though CBT and RET are treatments for mental illness, all individuals can benefit from the

methods found in these therapies to help them with the stressors of daily living and minimizing distress (Hunsley, Elliot, & Therrien, 2014; Engels, Garnefski, & Diekstra, 1993). Mental health is not just associated with mental illness, but also associated with enhancing the well-being of others when they are in distressing situations.

### *The Diathesis-Stress Model*

Many theorists and clinicians recognize the role of stress (distress) and stressful events as precursors to a variety of different mental illnesses. As proposed by Beck and other cognitive theorists, a model known as the diathesis-stress model attempts to model the role of stress in mental illness. This model states that a vulnerability (e.g. genetic inheritance, family history of a mental illness, an acquired way of thinking) paired with a stressful event that causes distress, can manifest the symptomology of mental illnesses, such as social anxiety disorder (Beck & Dazois, 2011). This model illustrates the interplay between nature and nurture, and suggests that some individuals may be more susceptible to mental illness than others may. For example, having a family history of anxiety, holding a belief that everyone is judging you negatively, and being an actor in an event that creates intense embarrassment (distress) in a social situation (e.g. an oral presentation) may be sufficient to lead to the manifestation of social anxiety. The diathesis-stress model also indicates that a positive environment, a positive experience, or positive thinking may promote resiliency, even if an event being experienced is perceived as negative and distressing.

### *Types and Conceptualizations of Stress*

It is apparent that there are two initial different types of stressors, positive stressors (e.g. a job interview) and negative stressors (e.g. a car accident). In addition, there are also different levels of stress in terms of intensity. There is acute stress (the demands of daily living; budgeting money), episodic acute stress (more frequent acute stress; living paycheck-to-paycheck), and

chronic stress (traumatic experiences; extreme poverty) (Fernandes et al., 2014). In fact, in much the same way as there are different types of stressors, there are also different types of stress.

First, there is negative stress, which is distress, and this conceptualization of stress views stress as a threat and correlates to risks of mental illness, potentially leading to cardiovascular disease, negative effects on performance, and the assumption that we should eliminate stressors from our lives (Jamieson, Mendes, & Nock, 2012). The second type of stress is positive stress. Positive stress is also termed eustress; it incorporates the view of stress as beneficial or a challenge and leads to improvements in performance, concentration, alertness, and is used as a tool in stressful situations. This type of stress was first demonstrated by optimal performance in the Yerkes-Dodson law (inverted U), but it was then revealed by Hans Seyle that optimal performance is an outcome of eustress (Seyle, 1974). The Yerkes-Dodson law dictates that performance increases with stress arousal, but only up to a point. At this point, performance is at its optimal level. When levels of stress arousal become too high, performance decreases (Dodson & Yerkes, 1908). Arousal relates to the physiological changes that are present during a stressful event, and is a key marker in measuring stress levels and emotional affect. Current literature suggests that eustress involves more than just an increase in arousal, but also the way in which stress arousal is conceptualized.

In 2012, Keller et al. explored perceived levels of stress and the perception of the impact of stress on one's health, in relation to mortality rates. One's perception of stress is based upon what one defines stress to be, and upon the functionality of stress. In other words, the way one defines stress is how one conceptualizes or appraises stress and stress arousal. Furthermore, the foundation of their study was based upon the held belief that the way that a stressor affects an individual is by their previous schema about stress itself. This schema could have been learned

from past life experiences, from education, or even from the observation of others. Keller and colleagues gathered data from a national household survey in 1998 and ran a correlation between the perception that stress affects health (During the past 12 months, how much effect has stress had on your health?) and death records obtained from 2006.

The authors found that “neither the amount of stress, nor the perception that stress affects health independently predicted premature mortality” (Keller et al., 2012). However, having both high amounts of stress and the perception that stress negatively affects health together was significant, as it predicted a 43% increase for the risk of premature death. Notably, individuals who reported high amounts of stress but who did not believe that stress negatively affects health were at no higher risk for premature mortality. The results of this study suggests that having a great deal of perceived stress may not attest that one will have an increased likelihood of premature death or the serious health issues, unless one also believes that stress itself has a negative impact on their health and well-being. Therefore, the affect that stress may have on an individual may reside in how they appraise stress and stress arousal.

### *Stress Reappraisal Intervention*

In 2013, Jamieson, Nock and Mendes designed a study that consisted of two experiments. The first experiment involved the analysis of subjective accounts of physiological arousal by individuals who have social anxiety disorder, compared to a control group (without a social anxiety disorder diagnosis). To highlight these accounts they used the Trier Social Stress Test (TSST) to psychologically stress and produce anxiety in the participants. The stress and anxiety is produced from a 5 min speech about themselves to a panel of three judges and an arithmetic task (counting backwards by thirteen). Objective physiological measures such as an electrocardiograph, an impedance cardiograph, blood pressure measures, and blood volume

measures were combined to obtain a cardiac output reading. The authors reported that even though socially anxious individuals believed that they experienced higher levels of arousal, there was no significant difference between groups on objective measures. A possible explanation may be that individuals with social anxiety disorder perceive their physiological arousal as more threatening.

What was made clear from this first study was that when all the participants were given the TSST there was a significant increase in cardiac output compared to baseline for all participants (baseline measure  $M = 0.24$  L/min; arousal measure  $M = 0.44$  L/min), meaning that arousal was indeed present. However, socially anxious individuals showed an increase in attentional bias when given an emotional Stroop Task towards negative (threat) words. This result is a common cognitive distortion that individuals who are afflicted with any anxiety disorder display; they tend to focus their attention on false threat cues, whether physical, mental, or environmental (Beck & Dazois, 2011). This also coincides with an emotional bias towards negative emotions such as embarrassment, shame, and fear.

Jamieson et al.'s second experiment followed the same procedure as the first experiment, however instead of comparing socially anxious individuals to non-socially anxious individuals, all participants, socially anxious or not, were randomly assigned to one of two groups: one group received reappraisal training on stress and stress arousal (stress reappraisal intervention), whereas the other group received no instruction. Stress reappraisal is a new hallmark of cognitive behavioral therapy (CBT) which "seeks to change the conceptualization of stress by informing individuals that stress arousal can be thought of as a resource that can enhance performance" (Jamieson, Nock, & Mendes, 2013). In other words, the participants are encouraged to change their mindset by conceptualizing stress arousal as positive and to use it as a resource when faced

with acute stress and in a stressful situation. Stress reappraisal creates differences in stress response similar to that of the biopsychosocial model of challenge and threat. According to this model, individuals evaluate task demands and their ability to meet those demands within motivated performance situations. When the individual believes they have the ability to meet the demand a challenge state occurs (higher cardiac output and lower total peripheral resistance), if they do not believe they have the ability then a threat state occurs (increased peripheral resistance and the release of cortisol) (Blascovich, 2008). Conceptualizing stress as positive in these individuals was accomplished before presentation of the TSST by informing them orally of the functionality and purpose of stress arousal, and having them read three summaries and answering questions outlining the positive aspects/outcomes of stress arousal and the benefits of stress in general.

The authors found that cardiac output (overall  $M = 0.58$  l/m,  $SD = .24.09$  l/m) and total peripheral resistance (overall  $M = 55.98$  dyne-sec/cm<sup>-5</sup>,  $SD = 126.34$  dyne-sec/cm<sup>-5</sup>) significantly increased from baseline for all participants during the TSST of the second experiment (overall  $M = .85$  l/m,  $SD = 1.38$  l/m;  $M = 150.81$  dyne-sec/cm<sup>-5</sup>,  $SD = 170.63$  dyne-sec/cm<sup>-5</sup>). However, there was an improvement in overall physiological functioning for individuals in the stress reappraisal condition, in addition to decreased peripheral resistance (vasoconstriction), increased cardiac output (stroke volume) and increased cardiac efficiency. It is often assumed that the increase in physiological arousal to a stressful event is what results in poor health. However, this arousal is necessary, especially when facing a challenge or threat, to help deal with the stressor in a way that increases performance and to help the person focus and survive. What this research shows is that conceptualizing stress arousal as positive decreases the negative effects of stress arousal on physiology, and that a reconceptualization of stress as

positive can have a positive impact on stress arousal responses. What is most intriguing is that when an individual exhibits an increase in heart rate without having an increase in blood pressure, this is consistent with arousal in an individual who is experiencing joy or happiness (McGonigal, 2013). Therefore, according to their physiology, it seems as if the participants were experiencing a positive emotional affect from the stress reappraisal intervention. However, the subject representation of the participant's emotion, and emotional bias towards positive words were not measured.

Jamieson and colleagues also looked at the ways in which reappraising stress arousal can affect attentional biases towards emotionally negative information by the use of the emotional Stroop tasks. Following the manipulation and The Trier Social Stress Test, the participants completed two emotional Stroop tasks. One Stroop task included a negative/threat word list and the other Stroop task a neutral word list. The authors found that participants in the positive stress reappraisal condition displayed significantly lower attentional bias towards emotionally negative information measured by emotional Stroop tasks, when compared to the control/appraisal condition (Jamieson et al., 2013). Anxiety is also as a fear of a future event with the possibility of a negative outcome. Either a fear of negative judgment by others or a fear of feeling embarrassment or shame, which is primarily in performance anxiety, involves a bias towards emotionally negative information and perceived threats. What these results show is that there is a potential to decrease anxiety for future events, which would be a preventative/protective measure. However, the authors failed to measure changes in subjective accounts of the participants' anxiety following the procedure.

In 2014 Beltzer, Nock, Peters, and Jamieson further studied the effects of stress reappraisal on affective displays (shame and anxiety), alpha-amylase production, and social



performance during an evaluative situation (TSST). Eighty-five community members (42 with socially anxiety disorder and 43 non-anxious controls) were divided into two conditions; a positive stress reappraisal instruction condition and a condition without instruction. Social anxiety was determined by the Mini International Neuropsychiatric Interview. Before and after the TSST the participants completed the Interaction Anxious Scale and the Beck Anxiety Inventory to measure state anxiety. Social performance was rated through nonverbal signaling (eye contact and fidgeting) and overall speech performance. The authors found that reported levels of anxiety were not affected by the condition, but participants who were encouraged to reappraise stress arousal as positive showed improved behavioral outcomes; they displayed more approachable nonverbal signaling (smiling and gesturing) and their overall performance was marginally better, but were not significantly different. In addition, the researchers found that when participants were encouraged to reappraise stress arousal, they displayed less anxiety and shame. Lastly, a significant difference was found in alpha-amylase production, a protein related to sympathetic arousal. The researchers reported that alpha-amylase production increased significantly higher for participants who reappraised stress arousal compared to participants in the control condition (Beltzer et al., 2014). Therefore, arousal was seen to increase and did not attenuate.

The study conducted by Beltzer and colleagues was an improvement upon the study by Jamieson and colleagues. However, the measure for behavioral outcomes was not standardized, no differences in reported state anxiety were found, and participants only displayed less anxiety and shame; this does not mean that they were displaying positive affect. The authors suggest that more evaluations should be made in other situations and populations, as studies using stress reappraisal intervention have found that the intervention can increase performance on some tasks

such as higher scores on the Graduate Record Examination prep test (Jamieson, Mendes, Blackstock, & Schmader, 2010) and improved math exam performance (Jamieson, Peters, Greenwood, & Altose, 2016). This study also failed to find a significant difference in social performance between conditions, as they only reported a marginal difference between the means.

### *Stress and Health*

When comparing the studies by Keller et al., Jamieson et al., and Beltzer et al., there is evidence that conceptualizing stress as positive and understanding it as a tool may correlate to health benefits. It may decrease attentional biases towards negative emotional information and threat cues, and improve state physiological performance and functioning. By comparing the studies even further, it can be inferred that the increase in premature mortality rates seen in the study by Keller et al. as characteristics of individuals having high amounts of stress as well as the perception that stress negatively affects health, may be related to physiological impairments, and a cardiac output and peripheral resistance that are insufficient.

In 2004, Matthews et al. studied the effects of blood pressure increase as the results of psychological stress on the development of hypertension. The participants had three stressors: a cold pressor task, a star tracing task, and a video game task. The authors report that individuals with a greater increase of blood pressure in response to psychological stressor may be at a higher risk for hypertension (Matthews et al., 2004). The increase in blood pressure caused by the vasoconstriction of arteries in a stress response may be responsible for the calcification of the arteries seen in atherosclerosis. Atherosclerosis is a heart disease that might lead to a heart attack, and subsequently death. According to Statistics Canada, heart disease has been the second leading cause of death consistently from year 2000 – 2009 in Canada (cancer is the first). In addition, heart diseases such as hypertension and atherosclerosis during this period have been

implicated in anywhere from 20.7% - 25.3% of annual deaths (Statistics Canada, 2012). It is apparent that hypertension is a serious medical condition that can lead to health complications and this is a reason why doctors insist that patients remove stressors from their lives, or find ways to cope with stress more efficiently. There are times, however, when stressors simply cannot be eliminated or when eliminating the stressor may lead to missed opportunity. Therefore, an intervention is appropriate to help any individual deal with distressing events.

### *Past Study*

A previous study was conducted by the author of this thesis to further explore different conceptualizations of stress and their effects on reasoning and problem solving ability (logical thinking), and mean arterial pressure (blood pressure). Logical thinking was measured using logical tasks found within the Wechsler Abbreviated Scale of Intelligence-II (WASI-II). A negative stress reappraisal condition was added from previous research. In addition, only one summary with two questions was used for each condition, instead of three summaries and two questions per condition conducted in previous research. The use of one summary was to determine if a weaker/subtle manipulation would show an effect. Chiasson (2014) found that participants who were encouraged to conceptualize stress as positive, had significantly higher performance on the similarities subtest compared to participants who were encouraged to conceptualize stress as negative. Furthermore, There was a medium positive linear correlation between the three instruction conditions on performance [ $r = .42, p = .014$ ]. The more positive the instructions, the better the performance on the similarities subtest. Different conceptualizations of stress did not affect blood pressure. This research suggests that verbal reasoning and problem solving performance, measured by the similarities subtest, may be improved by positive stress reappraisal intervention.

Verbal reasoning is the understanding of concepts, and it reflects the ability to make sense of our world through language. It is more than just the retrieval or recognition of information, it is the ability to think constructively, and it is associated with thinking and cognition. Thinking in regards to verbal reasoning is an internal dialogue with the self. Verbal reasoning is also important in the interpretation of the information that we gather. Problem solving is the ability to find the solutions to problems. If cognitive distortions are illogical interpretations and verbal reasoning is the ability to make interpretations, it can be inferred that different conceptualizations of stress may be related to cognitive distortions that arise from a negatively biased cognitive schema, the negative conceptualization of stress (Chiasson, 2014). From this research, Chiasson suggested that emotional affect should be explored further in relation to a stress reappraisal intervention, as it may have been a contributing factor to the results. Chiasson also suggested the employment of a more reliable apparatus for measuring the measurement of blood pressure.

### *Present Study*

In an attempt to extend previous findings, this study was designed to examine whether different conceptualizations of stress would influence emotional bias towards emotional information during tasks that provoke performance anxiety and acute stress, self-reports of state anxiety, social performance, and mean arterial pressure and heart rate in a non-clinical sample. If improvements are measured when individuals conceptualize stress and stress arousal in a positive way, these improvements may lead to further insight into managing performance anxiety. The present study's design was similar to that of 2013 study by Jamieson et.al and that of the study by Beltzer et al. in 2014, with some exceptions and improvements. There were three instruction conditions used; two reappraisal conditions; stress as positive and stress as negative,

and a control condition (appraisal). In the previous studies, there were two conditions, one reappraisal condition (stress as positive) and an appraisal condition (control). Furthermore, a positive emotional Stroop task was added, using a positive word list, along with a neutral Stroop task, and threat/negative emotional Stroop task seen in previous studies. In addition, the State-Trait Anxiety Inventory (STAI) was administered before and after the Trier Social Stress Test instead of the Interaction Anxiousness Scale (IAS), to determine if changes in subjective state anxiety can be measured with a different psychometric test. This is to see if positive stress reappraisal intervention could decrease subjective feelings of anxiety in a social situation. In addition, Mean Arterial Pressure ( $2 \times \text{diastolic pressure} + \text{systolic pressure} / 3$ ) and heart rate were measured instead of cardiac input and peripheral resistance, as MAP is equal to cardiac output  $\times$  total peripheral resistance. Lastly, The Social Performance Rating Scale will be used to determine overall performance during social evaluation with a standardized measure.

It was predicted that participants who reappraise stress as positive will exhibit more of an attentional bias towards positive emotional information in the Stroop task. This prediction is made from emotional priming, as a positive conceptualization of stress may evoke positive emotional information congruent with happiness or joy where as a negative conceptualization of stress may be similar to negative emotional information such as fear or shame. In addition, previous research states, "Optimism (a form of positive thinking) is primarily associated with extraversion and a positive affect" (Marshall et al., 1992). An individual with higher extraversion would display more social behaviours (e.g. enthusiastic, talkative, task enjoyment), and an increased positive affect would increase the participant's mood state (e.g. joy, interest). To the contrary, it was predicted that the individuals who reappraise stress as negative would have an increase in bias towards negative emotional information, thereby reinforcing the findings in

previous literature. It is also predicted that participants in the positive reappraisal condition will report lower levels of self-reported anxiety, compared to participants in the other conditions after an anxiety producing/stressful event. This is due to the physiological responses of the anxiety being reduced and due to the ability to interpret their physiological responses as beneficial, rather than viewing them as anxious symptoms that they fear to display from embarrassment during the performances. Even though past literature has studied state anxiety, the use of a different measure will be explored.

In addition, it was predicted that MAP would decrease or stay the same as baseline (challenge state) for individuals in the positive stress reappraisal condition and that MAP would increase for participants in the negative stress reappraisal condition. Thereby confirming results from previous literature in a manner that involves an apparatus that can be self-administered and used from home (a blood pressure monitor) without the complexity of many different apparatuses. As when peripheral resistance, blood volume, or cardiac output is increased, it should result in higher blood pressure.

Lastly, it is predicted that social performance would be significantly better for participants who reappraise stress arousal as positive. A decrease in social performance has been observed for social anxious participants during evaluative situations when compared to a control group (Cody & Teachman, 2011). If a positive stress reappraisal intervention decreases anxiety, social performance should increase. In contrary, a negative conceptualization of stress could mimic a socially anxious sample. Previous results from Beltzer et al. in 2014 suggest only a marginal difference in social performance however: the use of a standardized behavioral checklist would increase validity and may determine significant differences between conditions.

## Method

### *Participants*

This study successfully passed the ethics review by the Laurentian University Research Ethics Board (see appendix A). Participants were 52 undergraduate students from Laurentian University (39 women and 13 men;  $M$  age = 21.7) obtained via classroom recruitment and flyers. A brief check for colour blindness was conducted at the beginning of the procedure using Ishihara colour blindness plates. High blood pressure, the use of cardiac medication, and the use of anxiety medication/an anxiety disorder diagnosis were exclusion criteria for this study due to the possibility of jeopardizing physiological readings as these factors all can affect blood pressure and heart rate in manner that can be deemed abnormal. In addition, participants with colour blindness were exempt from the study as colour blindness interferes with performance on the emotional Stroop tasks. Sessions were completed between the hours of 11am - 2pm. If participants attended the session in apparent heightened arousal (e.g. fast breathing rate due to running to the testing room), the procedure was delayed for five minutes. One participant was removed from the study for meeting exclusionary criteria for high blood pressure during baseline measurements (apparent stage 1 hypertension), and another participant was removed for having unusually high baseline state anxiety on the State Trait Anxiety Inventory (+3 SD). The positive stress reappraisal condition and the negative stress reappraisal condition had an equal number of participants ( $n = 17$ ). The control group had 16 participants. There were an equal number of men (four) in each condition.

### *Manipulation/Conditions*

In concordance with the Jamieson et.al study in 2013, participants read three summaries according to their designated condition, and answered two questions in regards to each reading to

help solidify the information. The positive summaries outlined the positive aspects of stress and stress arousal (see appendix B for example), the negative summaries outlined the negative aspects of stress and stress arousal (see appendix C for example), and the control group simply read three summaries of chapters from an introduction to psychology textbook, which were unrelated to stress (see appendix D for example). Emotionally neutral chapters were chosen to control for extreme affect: statistics, sleep, and intelligence. Information obtained for the summaries on stress and stress arousal were retrieved from common websites that individuals within the general population could visit to obtain information on stress (Mayoclinic.org, WebMD.com, Healthline.com, etc.). One of the three pre-recorded audio clips was played for each participant, using definite and consistent tone of language with a computerized female voice. The purpose of the pre-recorded audio clips is to maintain consistency. For the positive condition, the exact same script used as in the studies conducted by Jamieson et al. was used. The script is as followed:

“In stressful situations, like public speaking, our bodies react in very specific ways. The increase in arousal you may feel during stress is not harmful. Instead, these responses evolved to help our ancestors survive by delivering oxygen to where it is needed in the body. [I] encourage you to reinterpret your bodily signals during the following tasks as beneficial.” (Jamieson et al., 2013)

A script was created for the negative reappraisal condition, which was used in Chiasson’s previous study in 2014, following the same format and structure as Jamieson et al. The script was as follows:

“In stressful situations, like public speaking, our bodies react in very specific ways. The increase in arousal you may feel during stress may sometimes be harmful. These



responses may release cortisol, which can suppress your immune system and affect your decision-making. I encourage you to pay attention to your bodily signals during these tasks.” (Chiasson, 2014)

A script was also created for the control condition, which was not related to stress or stress arousal. Following the same format and structure as Jamieson et al, the script was as follows:

“From one end to the other, psychology is an exciting field. It’s a field that addresses questions that have intrigued humanity for ages; including what it is that all humans have in common, distinguishing us from other species, and also how it is that humans differ from each other. It is a field that addresses a wide variety of deep philosophical issues.”

#### *The Trier Social Stress Test (TSST)*

The Trier Social Stress Test was used in this study to temporarily psychologically stress the participants with acute stress and invoke anxiety via activation of the HPA axis. The TSST is a reliable and valid procedure used to induce acute psychological stress and anxiety in participants via significant increases in physiological arousal (e.g. heart rate, blood pressure), cortisol levels, state anxiety, startle response, and is the gold standard in temporarily inducing psychological stress in research participants. (Herten et al., 2016; Pace et al., 2006; Allen et al., 2016; Kelly, 2008; Richardson, Rice, & Devine, 2014). In addition, this procedure was used in the previous literature on stress reappraisal intervention by Jamieson et al. (2013) and Beltzer et al. (2014). The protocol consisted of an anticipation/preparation period followed by a testing period. The anticipation period consisted of preparing an oral presentation, and the testing period consisted of the oral presentation itself followed by an oral arithmetic task. Participants were asked to take five minutes to prepare an oral presentation with a paper and pen about a given

topic (see appendix E). Before they performed their oral presentation, the notes they had prepared were taken away and the participants were then asked to stand up and begin. A video camera was turned on prior to performance, and the participant was recorded for the remainder of the oral presentation, having been told that the recording will be employed to analyze their body language. The researcher/judge remained stoic, and only told the participant that they still had time left and to please continue if they finished under the allotted time.

Once the five minutes were up, the video camera was turned off and the participants were asked to stop, continue to stand, and to count backwards from 1,022 by thirteen as fast and accurately as possible. Every time that the participant made a mistake, the researcher told the participant to start back at 1,022 and to try again. During this phase, the researcher constantly told the participant to speed up. After five minutes, the task ended, even if the participant did not complete the task to entirety. The participant was then instructed to sit back down (Kirschbaum, Pirke, & Hellhammer, 1993). For practical purposes, two modifications were made to the original protocol. Only the oral presentation was recorded compared to both the oral presentation and the arrhythmic task as only the oral presentation was being evaluated. In addition, only one judge was present (the researcher) compared to three judges due to limited resources. Once the TSST was completed, the participants were given a Likert scale (1-5) to give their own subjective account on how stressful the procedure was for them (1 = not stressful, 5 = extremely distressing). The overall purpose of using the TSST with modifications is to explore whether changing the protocol slightly to become more practical would still produce acute psychological stress in research participants.

### *The Social Performance Rating Scale*

The recordings of the oral presentations were examined using The Social Performance Rating Scale (SPRS) following the experiment. The measure specifically evaluates anxious behaviour and overall social performance during videotaped social interactions. The SPRS is a standardized rating system based on five rating scales out of five marks, but only four ratings were used; gaze, vocal quality, discomfort, and speech flow, speech length (5 minutes) is a controlled variable and was therefore omitted (Trower, Bryant, & Argyle, 1978). For each rating scale, standardized descriptions of behaviour are used to determine the participant's exact mark for the specific scale (appendix F). For example, a score of (1) for rating scale "gaze" would consist of completely avoiding eye contact throughout the entire speech whereas a score of (5) would consist of maintaining eye contact throughout the speech while shifting focus only during pauses. Participants were graded on the four individual ratings by the researcher two weeks after the completion of the entire experiment, who was blind to the condition of the participant (e.g. time delay, number coding, randomized order); however only the overall score was used for comparison, with a max score of 20. A blind rater was used to eliminate rater bias as a confounding variable in the study. A stronger social performance is represented by a higher overall score. Lower mean ratings have been found to be correlated with fear of public performance ( $r = .31$ ), greater clinician-rated social anxiety ( $r = .49$ ), avoidance of public performance ( $r = .35$ ), self-reported social phobia ( $r = .36$ ), and fear of negative evaluation (.31) (Harb, Eng, Zaider, & Heimberg, 2003). The SPRS is therefore a valid measure in rating social performance and socially anxious behaviour when videotaped.

### *Apparatus*

A Physio Logic Essentia Blood Pressure monitor was used in this study to measure mean arterial pressure (MAP) and heart rate measures from the brachial artery. It is an automatic home diagnostic device, which can be obtained from any drug store. Participants were asked to place their feet flat on the floor and rest their arm on a tabletop even with their heart. They were then instructed to lean against the back of the chair and to stretch out their arm, palm upward. The cuff was then placed 1 inch above the left elbow crease. They were asked to remove any watches or bracelets from the left wrist and/or arm. The cuff was then positioned tightly (so that only two fingertips could slip under the top edge of the cuff). Participants were asked to stay still and quiet during measurement, and then the start button was pressed. The cuff inflated until a reading could be taken. When the reading was complete, the monitor displayed the MAP and pulse (heart rate) on the digital panel. These results were then recorded on a designated sheet.

### *State–Trait Anxiety Inventory (STAI)*

The State-Trait Anxiety Inventory (STAI) is a 40 question self-report questionnaire that measures anxiety affect. A state component (20 Questions) measures the participants fear, nervousness, discomfort, and arousal at the exact moment. In addition, a trait component (20 Questions) measures the participant's dispositions for stress, worry, and discomfort. Each item is on a four point Likert scale ranging from low levels of anxiety to high levels of anxiety (Spielberger et al., 1983). Internal consistency is high (0.86), Test-retest reliability for trait anxiety is high (0.86), content validity ranges between 0.73 and 0.85, however construct validity is low as it has been found to be highly correlated with depression (Julian, 2011). Standardized protocol was upheld throughout the administration and scoring procedures.

### *Emotional Stroop Tasks*

Three emotional Stroop tasks were administered to measure attentional bias towards emotional information (appendix G). These tasks examined the number of correct responses for the naming colours of emotional words (Dresler & Meriau, 2009). Participants were instructed to name the colours (red, green, or blue) of the words within a 45 second window. A slower response time in naming the colour of a word represented a bias towards that specific word's emotionality, as it is assumed that attention to emotion promotes interference. The words were presented in three separate 60-word lists with 20 words in each colour. All words were selected by cross referencing online databases of emotional words. The negative list consisted of emotionally negative/threat words (ex. Hate), the positive list consisted of emotionally positive words (ex. Joy), and the neutral list consisted of emotionally neutral words (ex. Couch). Length of words, amount of syllables, and frequency of use were controlled to maintain internal validity. A lower score of correct responses in the 45 second window indicates interference and a bias towards the emotional information embedded in the words (positive or negative). To validate that emotional state was related to the interference, subjective accounts of the participant's emotional state were recorded both before manipulation, and after the administration of the TSST. Participants were given a force choice selection of neutral, happy, sad, disgust, anger, fear, or surprise

### *Procedure*

A brief check for colour blindness was completed using the Ishihara colour blindness plates (see table 1 for procedure timeline). Participants were given consent forms (see appendix H) and told about the functionality and protocol of the Physio Logic Essentia Blood Pressure monitor. Next, participants completed the STAI that provided a baseline estimate of state of

anxiety. Participants then gave their subjective account of their baseline emotional state (by selecting the emotion that was most represented of how they were feeling). Participants were assigned to one of the three conditions of the experiment, positive stress reappraisal, negative stress reappraisal, or the control condition in a sequential order. Each participant then read the three summaries for their designated condition, and answered the two questions for each summary. Following this, the participant's mean arterial pressure and heart rate were measured using the Physio Logic Essentia Blood Pressure monitor (baseline measure).

In the next phase of the experiment, one of the three pre-recorded audio clips was played for the participant to complete the manipulation. A brief description of the TSST was provided. Deception was used when explaining the TSST; instead of calling it a stress test the researcher told the participants that the protocol were simply activities or tasks. Then, the Trier Social Stress Test protocol was administered to the participant. Once the TSST was complete, mean arterial pressure and heart rate were immediately recorded for a second time (arousal measure). The participant then immediately completed the STAI once again (arousal/manipulation measure). The participant gave their subjective account of their emotional state for a second time (arousal measure), and indicated how stressful they found the procedure (Likert scale 1-5). Following this, mean arterial pressure and heart rate were measured one last time (recovery measure). Lastly, the emotional Stroop tasks (positive, negative, neutral) were administered participants in a random order to measure emotional attentional bias from the manipulation. Random order was used to limit, protect, and control for any possibility of practice effects from a rudimentary task. Once complete, participants were given a debriefing form; in this form, emphasis was placed on the positive aspects of stress and stress arousal and the manipulation script for the stress as positive condition was read to all participants to counteract any negative

effects from the study (appendix I). Participants were also praised for their efforts and encouraged to speak about their experience. The overall length of the procedure for each participant took approximately 60 minutes.

*Table 1: Procedure timeline*

1. Colour blindness test (Ishihara plates)
2. Consent forms offered and signed
3. Explanation of apparatus used for MAP and HR measures
4. Baseline state anxiety measure (STAI)
5. Baseline measure for emotional state (emotional word chosen)
6. Assignment to one of three conditions (positive reappraisal, negative reappraisal or control) in serial order
7. Participants read the summaries and answered the questions appropriate for their condition
8. Baseline measure for MAP and HR
9. Participants listened to the audio clip appropriate for their condition
10. Explanation of the TSST
11. Participants completed TSST (oral presentation preparation, oral presentation, and arithmetic task)
12. Arousal measure for MAP and HR
13. Arousal state anxiety measure (STAI)
14. Arousal measure for emotional state (emotional word chosen)
15. Likert scale on subjective TSST stress intensity was completed (how stressful?)
16. Recovery measure for MAP and HR
17. Stroop task administration: all three versions (positive emotions, negative emotions, and neutral) in randomized order
18. Participants were debriefed and thanked for participation
19. The researcher and blind rater rated participants' performance on the TSST (SPRS) upon reviewing the recordings at a later date

## Results

All analyses were carried out using IBM SPSS Statistics 22, using a threshold for significance of  $p .05$ . For all variables, assumptions of normality, kurtosis, skewness, and sphericity were met. Correlations between all three measures of MAP (baseline, arousal, recovery) were between .69 and .81. Correlations between all three measures of HR (baseline, arousal, recovery) were between .83 and .90. The reliability of the apparatus was confirmed.

Analyses of the main hypotheses were computed using analysis of variance (ANOVA) for between subject comparison and paired sampled t-tests were used for within subject comparison.

### *Stress Induction*

It was predicted that the modified TSST would induce stress in the participants. Ninety-eight percent of participants reported that they felt stressed during the TSST Protocol (18% mildly stressed, 32% moderately stressed, 42% highly stressed, and 6% extremely distressed). To explore further that the modified TSST would induce stress, the mean arterial pressure and heart rate between baseline and arousal conditions were compared. A paired-samples t-test was conducted to compare mean arterial pressure (MAP) of baseline and arousal for all participants. In addition, a paired samples t-test was conducted to compare heart rate (HR) baseline and arousal for all participants. The means and the standard errors of the mean for mean arterial pressure and heart rate for both baseline and arousal for all participants are displayed in Figure 1. There was a significant difference between MAP for baseline ( $M = 85.8$  mmhg,  $SE = 1.3$ ) and arousal ( $M = 88.7$  mmhg,  $SE = 1.2$ );  $t(49) = -3.66$ ,  $p = .001$ ;  $r = .15$ . There was no significant difference between HR for baseline ( $M = 76.5$  bpm,  $SE = 1.5$ ) and arousal ( $M = 77.6$  bpm,  $SE = 1.5$ ). These data suggest that participants subjectively felt stressed and blood pressure increased due to the TSST however; there was only a marginal difference between baseline and arousal measures for heart rate.



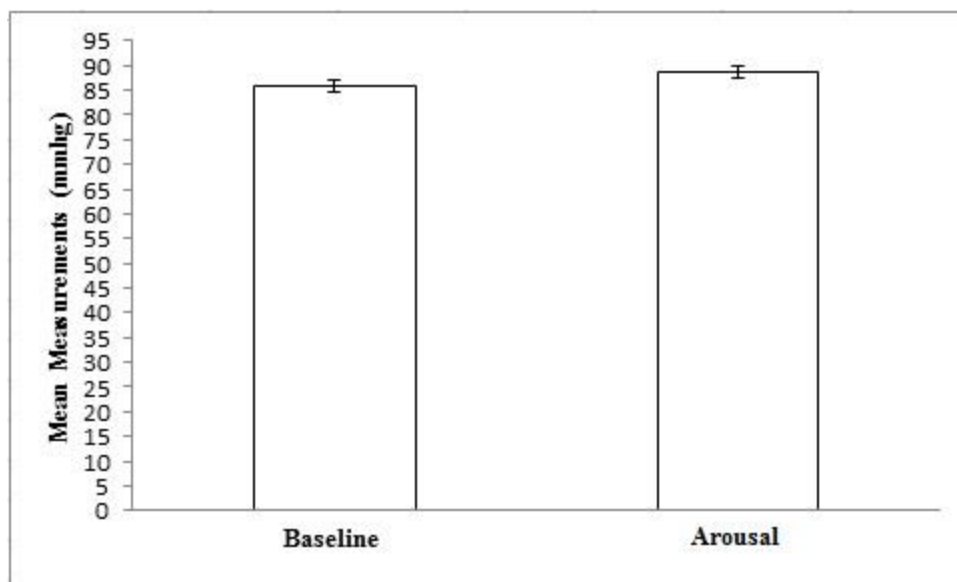


Figure 1a - The means and the standard errors of the means for baseline and arousal mean arterial pressure of all participants.

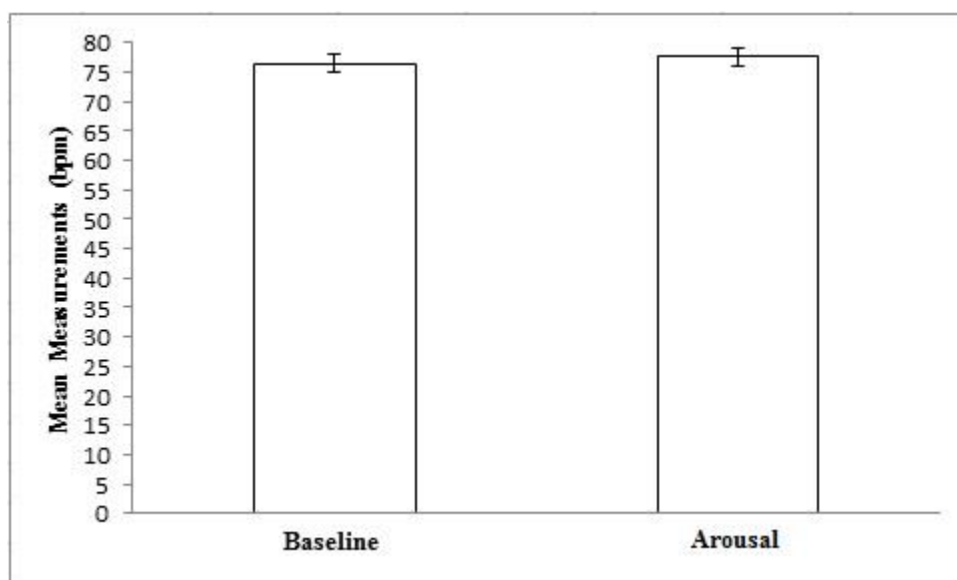


Figure 1b - The means and the standard errors of the means for baseline and arousal heart rate of all participants.

Another paired samples t-test was conducted to compare baseline state anxiety and arousal state anxiety for all participants. The means and the standard errors of the means for both state anxiety measures for all participants are displayed in Figure 2. There was a significant difference between baseline state anxiety ( $M = 32.4$ ,  $SE = 1.0$ ) and arousal state anxiety ( $M = 46.6$ ,  $SE = 1.5$ );  $t(49) = -8.59$ ,  $p = .000$ ;  $r = .60$ . An emotional shift was also identified, after the

TSST protocol. The two most commonly selected emotions prior to the TSST protocol were Neutral (60%) and Happy (38%). Following the TSST protocol, the most frequently selected emotions were Fear (48%) and Neutral (26%). Participants clearly identified as being more stressed after the TSST and their categorical description of their own emotions transitioned from more positive to negative words.

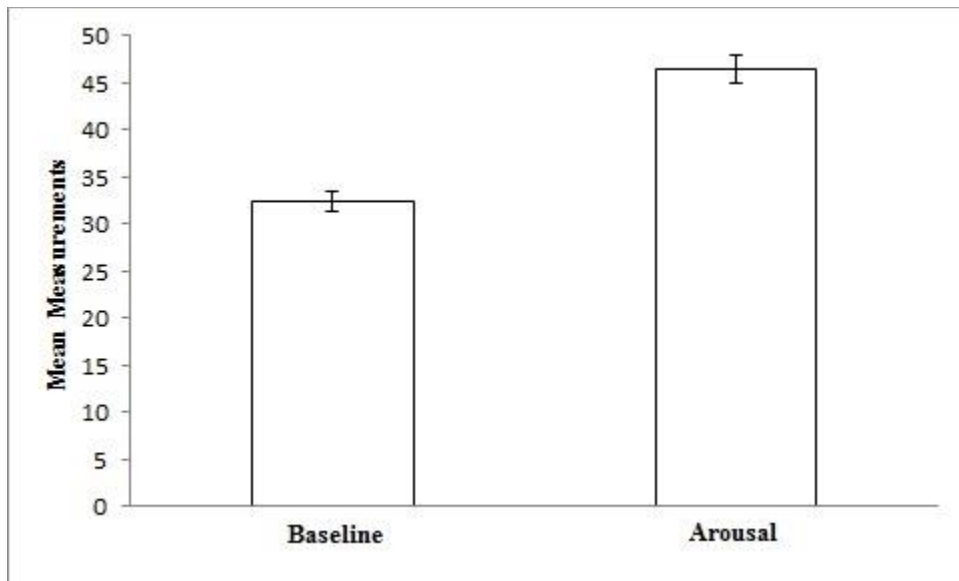


Figure 2 - The means and the standard errors of the means for state anxiety for both baseline and arousal of all participants.

### *Emotional Bias*

A one-way between subjects analysis of variance was conducted to compare the effects of stress conceptualization on emotional Stroop task performance. With respect to the three Stroop tasks that involved either positive, negative or neutral words, there were no significant differences among the three experimental groups ( $[F(2, 47) = .89, p = .41]$ ,  $[F(2, 47) = 1.2, p = .29]$  and  $[F(2, 47) = .58, p = .56]$ ). To investigate the possibilities of group differences further, new variables were computed. An overall emotion performance score was computed by adding the Stroop scores from the positive words and negative/threat words and dividing that score by two. The neutral word Stroop score was then subtracted by the emotional performance score to

create a net difference. A one-way between subjects analysis of variance was conducted to compare the effects of stress conceptualization on the net difference between emotion performance and performance on the neutral Stroop task. There was a not a significant effect of stress conceptualization on net difference at the  $p < .05$  level between the three conditions [ $F(2, 47) = .91, p = .40$ ]. A performance score was computed by adding the scores from each Stroop task and dividing the overall score by three. A one-way between subjects analysis of variance was conducted to compare the effects of stress conceptualization on overall Stroop performance. There was a no significant effect of stress conceptualization on performance [ $F(2, 47) = .90, p = .41$ ]. A Pearson chi-square test was computed to examine the relation between stress conceptualization and subjective accounts of arousal emotion. The relation between these variables was not significant,  $X^2(6, N = 50) = 3.80, p = .70$ . According to these results, the three different instruction conditions did not create an attentional bias towards emotional information (positive, neutral, negative).

#### *State Anxiety*

A one-way between subjects analysis of variance was conducted to compare the effects of stress conceptualization (positive reappraisal, negative reappraisal, control) on arousal state anxiety measures. The means and the standard errors of the means for both state anxiety measures for all participants are displayed in Figure 3. There was no significant difference among conditions [ $F(2, 47) = .70, p = .50$ ]. A net difference of state anxiety was computed for each participant (arousal anxiety minus baseline anxiety). A one-way between subjects analysis of variance was also conducted to compare the effects of stress conceptualization on state anxiety net differences. There was no significant difference among conditions [ $F(2, 47) = .34, p = .70$ ].

According to these results, the three different instruction conditions did not have an effect on self-reported measures of state anxiety.

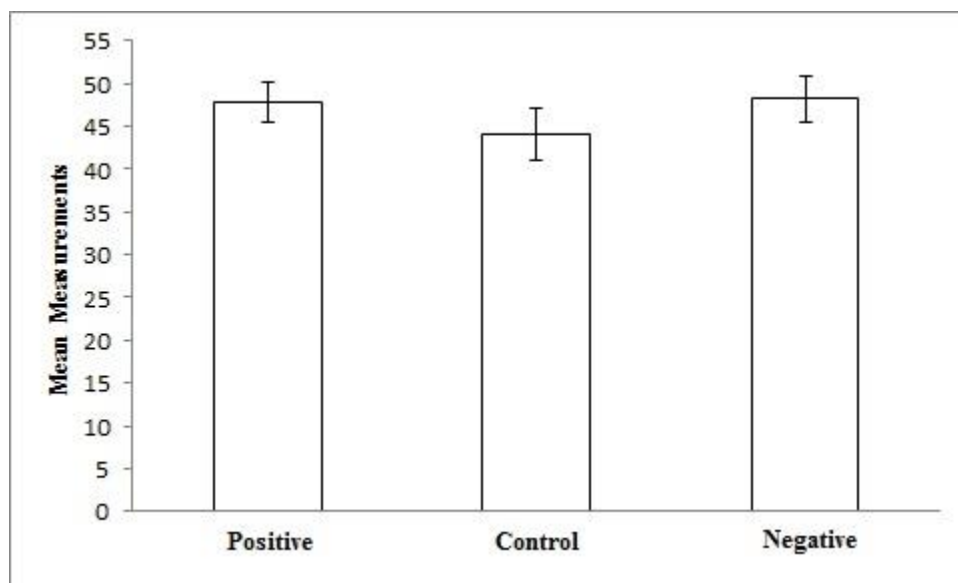


Figure 3 - The means and the standard errors of the mean for arousal state anxiety between conditions.

#### *The Social Performance Rating Scale*

An acceptable inter-rater reliability coefficient of  $\alpha = .75$  was computed based on a random sample of 20 ratings with a blind rater. A one-way between subjects analysis of variance was conducted to compare effects of the stress conceptualization manipulation on social performance during the oral presentation. The means and the standard errors of the means for overall social performance between conditions are displayed in Figure 4. There was a significant effect of stress conceptualization on overall performance rated by The Social Performance Rating Scale at the  $p < .05$  level for the positive ( $M = 11.7$ ,  $SE = .55$ ), negative ( $M = 9.4$ ,  $SE = .50$ ), and control ( $M = 10.6$ ,  $SE = .76$ ) conditions; [ $F(2, 47) = 3.59$ ,  $p = .035$ ;  $\eta^2 = .13$ ]. Post hoc comparisons using the Tukey HSD test indicated that the mean score of net difference for the positive condition ( $M = 11.7$ ,  $SE = .55$ ), was significantly different from the negative condition ( $M = 9.4$ ,  $SE = .50$ ). However, the control condition ( $M = 10.6$ ,  $SE = .76$ ) did not significantly

differ from the positive and negative conditions. A linear dummy variable was computed for all conditions with positive reappraisal equal to 3, control to 2, and negative reappraisal to 1. A trend analysis was then computed using a Pearson  $r$  coefficient to assess the linear relationship between conditions (where a higher number indicated a more positive appraisal of the situation) and oral presentation performance (where a higher score indicated greater performance). There was a medium strength positive linear correlation between the three conditions [ $r = .36$ ,  $n = 50$ ,  $p = .009$ ]. More positive appraisal was associated with higher performance scores.

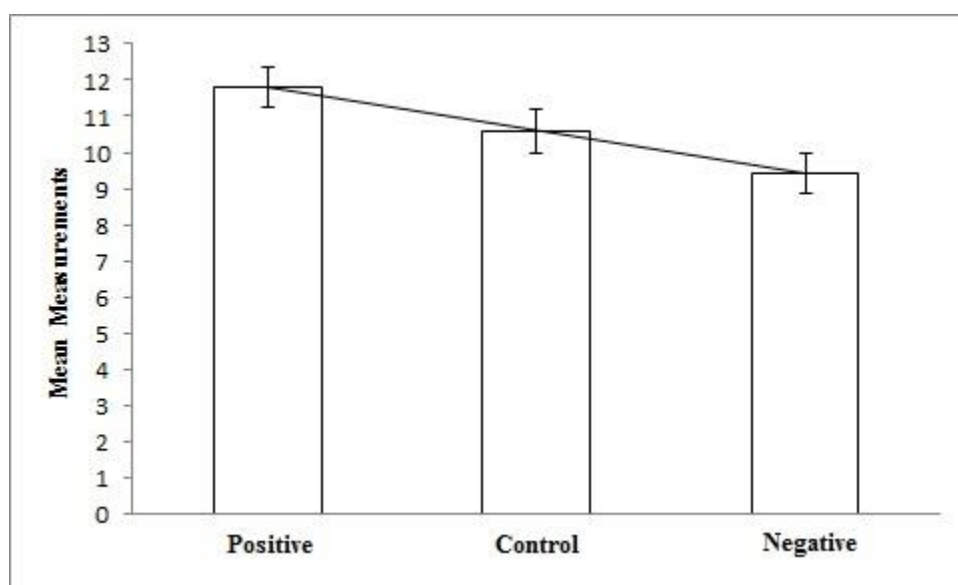


Figure 4 - The means and the standard errors of the mean for oral presentation performance between conditions.

### *Physiological Measures*

A net difference of physiological changes was computed for each participant (baseline minus arousal). A one-way between subjects analysis of variance was conducted to compare effects of stress conceptualization (positive reappraisal, negative reappraisal, control) on net differences of MAP. The means and the standard errors of the means for MAP net differences measures between conditions are displayed in Figure 5. There was a significant effect of stress conceptualization on MAP net differences at the  $p < .05$  level for the positive ( $M = -.1$  mmhg, SE

= 1.2), negative ( $M = 5.6$  mmhg,  $SE = 1.0$ ), and control ( $M = 2.9$  mmhg,  $SE = 1.4$ ) conditions; [ $F(2, 47) = 5.55$ ,  $p = .007$ ;  $\eta^2 = .15$ ]. Post hoc comparisons using the Tukey HSD test indicated that the mean score of net difference for the positive condition ( $M = -.1$  mmhg,  $SE = 1.2$ ) was significantly different from the negative condition ( $M = 5.6$  mmhg,  $SE = 1.0$ ). However, the control condition ( $M = 2.9$  mmhg,  $SE = 1.4$ ) did not significantly differ from the positive and negative conditions. A linear dummy variable was computed for all conditions with positive reappraisal equal to 3, control to 2, and negative reappraisal to 1. A trend analysis was then computed using a Pearson  $r$  coefficient to assess the linear relationship between conditions (where a higher number indicated a more positive appraisal of the situation) and MAP net differences (where a higher difference indicated a greater increase in MAP). There was a medium negative strength linear correlation between condition and the difference score [ $r = -.43$ ,  $n = 50$ ,  $p = .002$ ]. Appraisals that are more positive were associated with a lower increase (a drop) in MAP while appraisals that are more negative were associated with a rise.

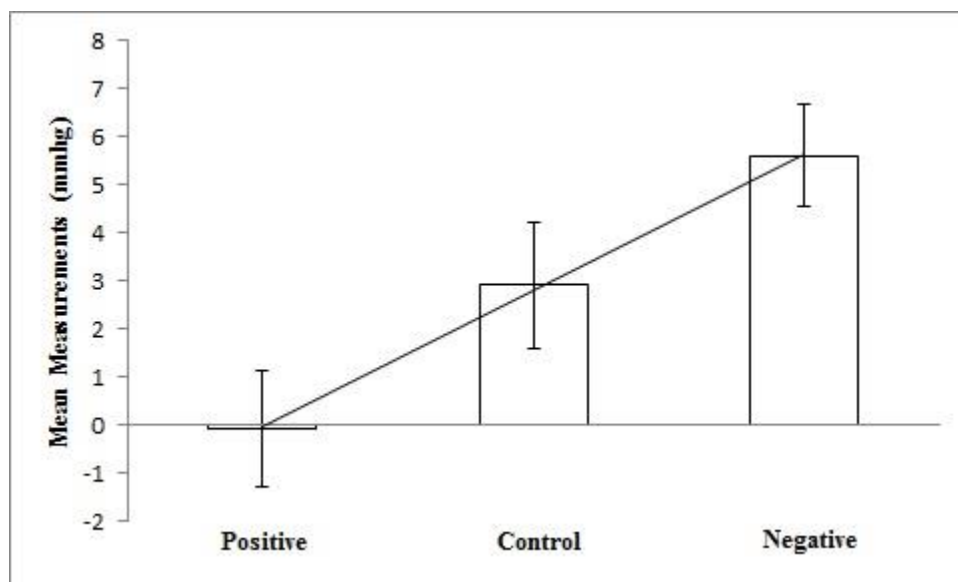


Figure 5 - The means and the standard errors of the means for MAP net differences between conditions.

A one-way between subjects analysis of variance was conducted to compare the effects of stress conceptualization manipulation on HR net differences. There was no significant effect of stress conceptualization on HR net differences at the  $p < .05$  [ $F(2, 47) = .11, p = .89$ ]. Therefore, the three different instruction conditions did not have an effect heart rate. A net difference score for MAP was computed for each participant (recovery MAP minus arousal MAP). A higher value on this difference score would indicate that MAP was higher in recovery than in the arousal phase. A one-way between subjects analysis of variance was conducted to compare effects of stress conceptualization on net differences of MAP. There was no significant effect of stress conceptualization on MAP net differences at the  $p < .05$  level between conditions; [ $F(2, 47) = 1.96, p = .15$ ]. A one-way between subjects ANOVA was conducted to compare effects of stress conceptualization on HR net differences (recovery HR minus arousal HR). There was no significant effect of stress conceptualization on HR net differences at the  $p < .05$  level between the three conditions [ $F(2, 47) = 1.96, p = .15$ ]. According to these results, the three different instruction conditions did not have an effect on both MAP and HR recovery measures. This suggests that regardless of the condition, the physiology of the participants did not differ in returning to baseline, five minutes after initial arousal.

## Discussion

### *Validity of the Modified TSST as a Technique for Stress Induction*

For this study, it was important that stress be induced within the participants. According to the results, the participants reported that they felt stressed during the one-on-one (modified) TSST protocol. The vast majority (80%) of the participants reported the protocol to be moderately stressful to extremely distressing (32% moderately stressed, 42% highly stressed, and 6% extremely distressed). Self-reports on state anxiety during the arousal measure drastically increased from baseline (baseline  $M = 32.4$ ,  $SE = 1.0$ ; arousal  $M = 46.6$ ,  $SE = 1.5$ ), illustrating that the participants were experiencing subjective increases in stress and anxiety from the protocol. The emotional shift also gives insight into how the participants were feeling during the protocol. The majority of the participants said that they felt either neutral or happy before the TSST (98% aggregate). However after the TSST protocol, the majority of participants felt either fear or neutral (74% aggregate). The emotional shift represents that the protocol was eliciting a fear (anxiety) or diminishing positive affect. From both subjective and objective measures, it can be inferred that the participants felt or perceived to be stressed during the TSST.

Reflecting upon previous literature, this is the first time that one judge was present during the oral presentation as well as nullifying the video recording of the arithmetic task, as modifications for the TSST. In a study done in 2015, the authors illustrated that acute stress and anxiety can be produced with an electronic audience/E-TSST (three judges through video chat) for the TSST (Hawn et al., 2015). However, the present study shows that only one judge/observer needs to be present to produce stress and anxiety within participants. What remains constant with all the protocols used was that the participants were told in advance that their body language was going to be videotaped and analyzed. It could be that just the thought of



being evaluated by others, much like how is seen with social facilitation, is sufficient in creating stress and anxiety. Social facilitation is the phenomenon in which the presence of others along with an anticipation of a positive or negative outcome/evaluation affects performance (positively or negatively) and increases arousal (Cottrell, Rittle, Sekeraj, & Wack, 1968). Even though this was not the main purpose of this study, these results show that this may be an alternate way in delivering the TSST, which is valid in producing acute psychological stress and anxiety in participants. More specifically, this research has shown that even with one judge present and only the oral presentation being recorded; it can still produce a testable level of stress and anxiety. This may be a great alternative when resources are low, and there is difficulty in finding confederates to participate as judges. This modified protocol can be named the modified 1-on-1 Trier Social Stress Test.

#### *Emotional Bias: Performance on Stroop Tasks between Conditions*

As measured by the emotional Stroop Tasks, there were no differences in attentional bias between conditions. This is unexpected, as previous literature by Jamieson et al. (2013) has found that a positive conceptualization of stress reduces a bias towards threat words. The key difference in the present study was that a non-clinical population was not compared to a population that fits the criteria for social anxiety. This demonstrates that a condition with a negative conceptualization of stress is not comparative to that of a clinical sample with social anxiety. Even though socially anxious individuals do view their own arousal and stress as a threat, their thoughts may include negative conceptualizations in other areas that affect their daily living (e.g. distress, fear of injury, and/or fear of rejection, fear of judgment, fear of shame, etc.) that lead to an overall emotional bias. For a non-clinical sample, it appears as though one's conceptualization of stress and stress arousal does not influence an emotional bias towards

threats nor positive words. All emotional words used in the Stroop tasks were selected by cross referencing online databases of emotional words; even though consistency was obtained (word length, colour, etc.) when creating the Stroop tasks, internal consistency was not tested prior to administration. Results may have been different if the emotional Stroop tasks were edited and then verified with a pilot study before adopting them into the study. In addition, availability of a standardized emotional Stroop tasks for research and clinical applications would allow for increased validity and reliability when administered and scored.

#### *Stress reappraisal's lack of effect on Arousal State Anxiety between Conditions*

Much like in previous research from Beltzer et al. (2014), no significant difference was found between arousal manipulation conditions for state anxiety. The purpose of using the state trait anxiety inventory (STAI) was to see if previous results were merely due to the validity of the measurement used. Even with a different measure of state anxiety (STAI), there was still no difference. The STAI has been shown to be a valid measure in determining state anxiety when using the TSST (Birkett, 2011), so these results were unexpected. CBT techniques such as stress reappraisal have been shown to help individuals with anxiety. What this result suggests is that CBT is a technique or mode of therapy that does not affect one's subjective experience of their stress and anxiety until intervention is longer than one session. In addition, the original authors of the TSST found that subjective measures of stress were only different during the TSST, not before or after the TSST. They found that measuring during the TSST is the best as it is in the moment. A post measure would be a recall of the event, in which the event may be perceived as less stressful (Hellhammer & Schubert, 2012). Results might have been different if the STAI had been administered to the participants before the arithmetic task (halfway through the TSST). This was not executed during the present study, as it was thought that the delay of completing the

STAI would decrease arousal. In addition, the researcher followed the procedure timeline of Beltzer et al. 2014.

#### *Differences between conditions for the Social Performance Rating Scale*

Results from this study show that when one conceptualizes stress and stress arousal as positive they have improved social performance. Participants in the positive reappraisal condition ( $M = 11.7$ ,  $SE = .55$ ) exhibited an increased total performance score (improved speech flow, vocal quality, and gaze and less discomfort) when compared to individuals in the negative reappraisal condition ( $M = 9.4$ ,  $SE = .50$ ). These results show that when conceptualizing stress and stress arousal as beneficial rather than harmful, one may exhibit less discomfort and allow for an overall better performance when delivering an oral presentation. Previous research by Beltzer et al. in 2014 examined stress reappraisal intervention on social performance but did not use a standardized measure/checklist and the authors did not find significant differences between conditions within a clinical population. These current results show that there is a significant increase in social performance when stress is conceptualized positively compared to conceptualizing stress negatively. In addition, previous research on stress reappraisal has shown that conceptualizing stress as positive can significantly increase performance on the Graduate Entrance Exam (Jamieson et al., 2010) and a written math examination (Jamieson et al., 2016) when compared to a control. Not only does the present study add another task that stress reappraisal improves, it also suggests how positive appraisal increases performance - by decreasing discomfort while maintaining a state of heightened perceived stress.

#### *Changes in Physiological Measures due to Stress Reappraisal Manipulations*

As expected, participants who were instructed to conceptualize stress as positive showed a reduction of MAP from baseline to arousal, whereas the other conditions produced an increase

in MAP from baseline to arousal. This may show that physiological stress is improved during a stressful event when stress arousal is perceived as beneficial in a non-clinical population. In addition, frequent periods of high blood pressure commonly associated with a stress response (episodic acute stress) are associated to an increased risk for persistent hypertension (Eliot, 2016). By minimizing the frequency of high blood pressure and reducing blood pressure during acute stress, further research with using stress reappraisal intervention may lead to minimizing the risk of persistent hypertension. A positive conceptualization of stress has been shown as a tool that can decrease blood pressure during an event of social evaluation compared to control and a negative conceptualization. The results of this research duplicate previous results, but in a more practical manner; a blood pressure measurement (MAP) is sufficient in observing the beneficial effects of stress reappraisal on one's physiological functioning. In addition, the CBT model highlights how physiology, emotions, behaviours, and thoughts all interact with one another during distress. Improving and gaining a better understanding of one's own physiological functioning can help in modifying their mood, thinking, and behaviours more readily.

There was no significant difference for heart rate between conditions or pre and post TSST. There are two possible explanations for the lack of difference. First, although an increase in heart rate is related to stress, there is "no single pattern of autonomic adjustments and associated changes in heart rate (that) will apply universally across distinct stressors" (Berntson & Cacioppo, 2003). This entails that the stressor may have induced stress in the participants without them exhibiting all the signs of physiological arousal that is commonly associated to stress. Secondly, a common symptom of performance anxiety and anger is blushing. Blushing, or reddening skin, is caused by an increase in cutaneous blood flow to the face, neck and/or upper

chest that involves an increase in blood pressure (Drummond, 1997). Participants may have felt embarrassed during the TSST that lead to an increase in blood pressure, but not an increase in heart rate. Embarrassment may have derived due to a fear of judgment and shame, about presenting on a topic that can be scrutinized (e.g. future career goals, achievements, major area of study). When the participants made a forced choice selection of the emotion that they were feeling subjectively during the TSST, participants were not given embarrassment as an option. Perhaps the reason fear was the most selected emotion (anger as second most selected), was due to their fear of judgment and/or shame.

In addition, the autonomic nervous system, which is responsible for the physiological changes that are present during a stress response, has a homeostatic function. The homeostatic function of the autonomic nervous system is carried out by baroreceptor reflexes. It is apparent that when there is an increase in activity for one baroreceptor branch, there is a decrease in activity for another (Berntson & Cacioppo, 2003). This means that when there was an increase in blood pressure from the stressor, heart rate did not change (a function of homeostasis) to bring blood pressure levels back to normal. In addition, in a previous study using the TSST, the author found that on average heart rate increased to its highest point during the oral presentation, and then dropped during the arithmetic component (Birkett, 2011). During the present study, heart rate was measured after the arithmetic component of the TSST when physiology began decreasing back to baseline. As participants were instructed before the TSST protocol, heart rate and blood pressure was to be measured when the protocol had finished. This may have created a feeling of relief in the participants, knowing that the stressful event has ended. If heart rate had been measured during the oral presentation or prior to the arithmetic tasks, results may have been different, as the homeostatic function may not have affected heart rate at that time, as the

participant would still be experiencing the stressor and not a feeling of relief from the removal of the stressor.

### *Future Research*

I would first suggest using a larger sample size to increase group power that may lead to increased significance with small effects due to increased statistical power. I would also suggest incorporating a more diverse sample or other specialized samples, as students are consistently under acute stress from their studies. In addition, athletics should be a controlled or recorded variable in future research as athletes display improved physiological functioning (e.g. lower resting heart rate, faster recovery time) compared to the average individual. Stress reappraisal research resides within the realm of acute/mild stress. Future research should look at chronic stress, such as adverse childhood experiences (ACE). ACE's are traumatic experiences that are distressing and disturbing that happen during childhood. For example, neglect, abuse (emotional, physical, sexual) and witnessing domestic violence. More specifically, individuals with ACE are more likely to have higher stress levels (Austin et al., 2015). Research shows that a significant portion of adults who have four or more ACE are at a higher risk of depression and anxiety disorders, higher risk of heart disease and cancer, and die on average 20 years earlier, when compared to individuals with fewer ACE (Fellitti et al., 1998 & Brown et al., 2009). The individuals who have experienced ACE's in their lives cannot simply eliminate their stressor. Along with stress triggering mental illnesses by way of multifinality (stress leading to many mental health outcomes), it also may create health problems such as hypertension and heart disease, or even premature death. The outcomes associated to ACE's are closely related to perceiving that stress affects one's health negatively. This along with having the inability to avoid some stressful situations in terms of ACE makes studying ways to cope with stress and

stress arousal with chronic stress an extremely important area of research. Stress reappraisal intervention may be one tool of many, which can help individuals who have had adverse childhood experiences. It can also be a protective factor, along with social supports, that can improve their mental health as an adult.

Future research should explore the modifications used in this study for the TSST to increase reliability and validity of producing stress and arousal in research participants. Other objective measures (e.g. cortisol levels, Alpha-amylase levels, galvanic response, and breathing) used in previous research to verify the presence of acute stress in participants when delivering the TSST should be measured. This would be to increase the validity of a more practical protocol and to make comparisons between other modified protocols of the TSST. The use of a more practical protocol would be beneficial for researchers that have a limited amount of resources (e.g. undergraduate students, graduate students) to be able publish research on the effects of psychological stress more readily. It is also suggested that arousal measures (e.g. state anxiety, blood pressure, heart rate) should be recorded during the TSST (e.g. during the oral presentation, before the arithmetic task). Research states that if recorded during this period, they may give a more accurate representation of the participants stress/anxiety levels (Hellhammer & Schubert, 2012.) and arousal levels (Birkett, 2011). The researcher of this study would also suggest a longitudinal study that consists of multiple interventions of stress reappraisal (e.g. three, five, and seven) to study if it would create a difference on state anxiety measures (e.g. Beck anxiety inventory, State-Trait Anxiety Inventory). It is apparent from this study, as well as previous research, that a short-term intervention (three summaries on the positive aspects of stress and stress arousal) does not affect subjective state anxiety. Perhaps much like classical CBT protocol, positive outcomes on state anxiety from stress reappraisal may only be apparent after an X

number of interventions. With identifying the amount of interventions required to see a significant decrease in state anxiety, a program can be created and made accessible to the general population to help with performance anxiety. In addition, different degrees of manipulation can be compared (e.g. three summaries, three summaries a week for two weeks, etc.). Further research should also explore using a positive Stroop tasks along with the other Stroop tasks. Previous literature used just a threat word list and a neutral word list. A positive word list should be done with a clinical sample and non-clinical sample alike with a standardized emotional Stroop task. Even though attentional bias towards negative emotional information has been shown to decrease, an increase in attentional bias to positive emotional information would show that stress reappraisal intervention replaces a negative emotional affect with a positive emotional affect.

### *Conclusion*

It is apparent through previous research on stress reappraisal intervention that conceptualizing stress and stress arousal as positive can lead to benefits. Positive conceptualization has been shown to increase performance on tasks, to improve physiological functioning, and to decrease emotional bias towards threat words in a clinical sample. Furthermore, Chiasson's previous research (2014) has shown that positive reappraisal can increase verbal reasoning skills (the ability to think constructively and make interpretations) and that it may be related to cognitive distortions (illogical interpretations of the self or the environment). What is apparent in the present study is that different conceptualizations of stress affect social performance on a standardized measure by positively or negatively affecting social performance (vocal quality, speech flow, gaze, and discomfort). Furthermore, this research shows that improvement of physiological functioning can be seen at the level of blood pressure.



Blood pressure may also be the contributing factor for cardiac efficiency from previous research by Jamieson et al. in 2013.

In general, the implications that can be drawn from this study is that if one who perceives stress and stress arousal as beneficial may experience an increase in their performance during a social evaluation situation, a decrease in the negative effects of stress arousal on physiology, and a positive impact on stress arousal responses. In accordance with past research, one may be able to get past the challenges that life throws at them by thinking constructively and interpreting themselves and/or their environment more effectively, while increasing performance and limiting their chances for cardiovascular disease. Conceptualizing stress as positive can even be used as a tool to help one cope with stress, which may lead to a happier outlook on life and a better quality of, especially for students. Lastly, results may help students minimize performance anxiety by giving them another tool to cope with the stress of an oral presentation and minimize overt behaviours of discomfort, thereby increasing their performance under evaluation.

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## Appendix A: Ethics Approval



### APPROVAL FOR CONDUCTING RESEARCH INVOLVING HUMAN SUBJECTS Research Ethics Board – Laurentian University

This letter confirms that the research project identified below has successfully passed the ethics review by the Laurentian University Research Ethics Board (REB). Your ethics approval date, other milestone dates, and any special conditions for your project are indicated below.

TYPE OF APPROVAL / New X / Modifications to project / Time extension	
<b>Name of Principal Investigator and school/department</b>	Trevor Chiasson, supervisor Cynthia Whissell, Psychology
<b>Title of Project</b>	Stress Reappraisal and its Effects on Emotional Bias, State Anxiety, Social Performance and Physiological Measurements
<b>REB file number</b>	6008402
<b>Date of original approval of project</b>	October 05, 2016
<b>Date of approval of project modifications or extension (if applicable)</b>	
<b>Final/Interim report due on:</b> <i>(You may request an extension)</i>	October, 2017
<b>Conditions placed on project</b>	

During the course of your research, no deviations from, or changes to, the protocol, recruitment or consent forms may be initiated without prior written approval from the REB. If you wish to modify your research project, please refer to the Research Ethics website to complete the appropriate REB form.

All projects must submit a report to REB at least once per year. If involvement with human participants continues for longer than one year (e.g. you have not completed the objectives of the study and have not yet terminated contact with the participants, except for feedback of final results to participants), you must request an extension using the appropriate LU REB form. In all cases, please ensure that your research complies with Tri-Council Policy Statement (TCPS). Also please quote your REB file number on all future correspondence with the REB office.

Congratulations and best wishes in conducting your research.

Rosanna Langer, PHD, Chair, *Laurentian University Research*



## Appendix B: Positive Reappraisal Example

Psychologists have written about the positive effects that may occur in the wake of stressful events. It is believed that it is not simply the events in our lives that cause stress; it is the way we think about them. Studies exploring a variety of stressful events have found that typically over half of individuals who experience a traumatic life event report some degree of positive outcomes as a result, including changes in self-perceptions, social relationships, and life perspective. In other words, stressful events can have long-term positive effects and can help people to understand more about themselves, their social network, their priorities, and their lives in general. Stress is a normal response, but there are times when the physiological responses to stress such as increased heart rate and breathing become misinterpreted as a negative event. In fact, these responses occur to help the individual stay focused and alert to better deal with a challenge or stressful event.

The positive changes in an individual following severe life stressors typically include the belief that one is a stronger person and is better able to handle the blows that life will throw at them. Stress is a drive, or a motivating factor, that can help one study for a test or make that last second throw to win the game. What causes stress depends on your perception of it, and different people hold different perceptions on different events. Stress is not always from an external event; stress can be generated by the individual by way of unrealistic expectations (I have to be the smartest) and negative self-talk (There is no way I can get this done). Stress is what you want it to be; it can be distressing and take control of your life or you can take control and use it as a tool to increase your performance in challenges you face.

1. Why do the physiological responses to stress occur?

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2. How can stress be used as a tool?

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### Appendix C: Negative Reappraisal Example

Stress symptoms may be affecting your health, even though you might not realize it. You may think illness is to blame for a headache, frequent insomnia, or decreased productivity at work. However, distress may actually be the culprit. Studies have shown that stress symptoms can affect your body, your feelings, and your behavior. Stress itself can contribute to many health problems, such as high blood pressure, heart disease, obesity, and diabetes. Stress also has been linked to suppression of the immune system thereby increasing your chances of becoming ill or altering the course of an illness if you already have one. Some common effects of stress on your body may include; a headache, muscle tension or pain, chest pain, fatigue, change in sex drive, upset stomach, and sleep problems. Some common effects of stress on your mood may include; anxiety, restlessness, lack of motivation or focus, feeling overwhelmed, irritability or anger, and sadness or depression. However, stress can also affect your behaviour, some common effects include; overeating or undereating, angry outbursts, drug or alcohol abuse, tobacco use, social withdrawal, and exercising less often.

Stress symptoms can also affect one's cognition, and emotions. The cognitive signs of stress include; mental slowness, confusion, general negative attitudes or thoughts, constant worry, mind racing at times, difficulty concentrating, forgetfulness, difficulty thinking in a logical sequence, the sense that life is overwhelming, and the inability to solve problems. Stress therefore decreases our mental capabilities. The emotional signs of stress include; irritation or agitation, no sense of humor, loneliness, frustration, jumpiness/over excitability, feeling overworked, feeling overwhelmed, feeling like you are losing control, sense of helplessness or worthlessness, apathy, and low self-esteem. Stress is therefore something that can affect many different areas of our lives and can be very distressing.

1. What are the common effects of stress listed that affect mood?

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2. Name five cognitive signs of stress.

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## Appendix D: Control Example

Scientific observations typically begin with a question or hypothesis. The hypothesis must be specific enough to be testable; so that it will be clear, what results might falsify the hypothesis. This requirement for testability usually calls for an operational definition of the key terms in the hypothesis, in order to specify the study's dependent variable. The data for a study must also be systematically collected, and so researchers usually ignore anecdotal evidence. Based on their observations of a sample, psychologists want to draw conclusions about a broad population. In random sampling, every member of the population has an equal chance of being picked to participate in the study. Researchers sometimes turn to other procedures, including case studies. Often, researchers want their study to mirror the circumstances of the broader world; in this case, they need to ensure the study's external validity. This validity depends on many factors, including the requirement that the study itself not change the behaviors the researchers hope to understand. One concern here involves the study's possible demand characteristics—cues that can signal to the participants how they are supposed to behave.

Researchers use descriptive statistics to summarize the data from their studies. These include measures of central tendency of the data, often computed as the mean, and measures of the variability, often assessed by the standard deviation. Researchers also use correlations to summarize the pattern of their data, asking whether changes in one measurement are somehow linked to changes in some other measurement. These linkages are often summarized via a correlation coefficient,  $r$ . Correlations can be used to check on the reliability of the measurements, and they are one way to assessing the measure's validity. Researchers use inferential statistics to make inferences based on their data. This process often involves testing a difference between two groups, and it typically provides an assessment of a result's statistical significance—ultimately expressed as a  $p$ -value, the probability of getting the data pattern just by chance.

1. Why must a hypothesis be specific enough to be testable?

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2. What is a  $p$ -value?

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## **Appendix F: Social Performance Rating Scale**

We would like you to rate the speakers on a scale of 1 to 5 on the features listed below. For each feature, specific guidelines have been suggested for the different scores that you can give to the speakers. Use these guidelines to determine the appropriate score.

### **GAZE**

**(1) Very Poor:** Participant completely avoids looking at the audience or stares continually.

**(2) Poor:** Participant avoids eye contact (or stares) for majority of time. Disruptive to performance.

**(3) Fair:** Participant frequently avoids eye contact (or stares). Gaze pattern is mildly disruptive to performance.

**(4) Good:** Participant occasionally avoids eye contact or tends to look too much (stares).

**(5) Very Good:** Participant keeps eye contact during the speech, does not stare; shifts focus during pauses.

### **VOCAL QUALITY**

**(1) Very Poor:** (a) Participant speaks in a flat, monotonous voice; or (b) speaks at a low volume or mumbles; or (c) speaks overly loudly, or has intrusive tone (harsh or unpleasant voice quality).

**(2) Poor:** (a) Participant demonstrates no warmth, enthusiasm, or interest in verbal expression; or (b) volume somewhat low and speech somewhat unclear; or (c) speaks a little bit too loudly, or tone is somewhat intrusive or sarcastic.

**(3) Fair:** (a) Participant shows some warmth in verbal expression but at most times sounds unenthusiastic or uninterested; and (b) speaks in appropriate volume (given partner's volume); has clear voice quality; and (c) does not have an intrusive or sarcastic tone.

**(4) Good:** (a) Participant shows moderate warmth and but inconsistent enthusiasm or interest. Could also be too 'gushy' (seems fake or forced); and (b) and (c) are as in Fair.

**(5) Very Good:** Participant is warm and enthusiastic in verbal expression without sounding condescending or gushy.

### **DISCOMFORT**

**(1) Very High:** Complete rigidity of arms, legs or whole body. Constant leg movements or fidgeting with hands, hair or clothing. Extremely still face or constant facial tics. Frequent nervous throat clearing, swallowing, or stuttering. Frequent inappropriate giggling or laughing.

**(2) High:** Rigidity or fidgeting for majority of time. Difficulty sitting still is somewhat disruptive to conversation. Still face or frequent facial tics. Some nervous throat clearing or swallowing.

Some inappropriate giggling or laughing. Participant shows signs of discomfort by frequently looking around.

**(3) Moderate:** No rigidity. Slight movement of legs, fidgeting, throat clearing, or swallowing. Participant shows only brief periods of discomfort.

**(4) Low:** No rigidity, nervous throat clearing, or swallowing. Minimal fidgeting that is not disruptive to performance. No notable signs of discomfort. At times may appear relaxed and at ease (smiling or gesturing).

**(5) Very Low:** Relaxed body posture and natural body movement. Participant laughs and smiles at appropriate times. S/he shows effective gesturing (to be distinguished from fidgeting). Participant focuses on the speech task all the time, does not appear at all uncomfortable, but at ease in situation.

### **SPEECH FLOW**

**(1) Very Poor:** Participant is unable to speak continuously and logically on the topic. Participant speaks in fragments of speech, often loosely connected or marked by grammatically incorrect conjunctions. Participants' speech is marked by unintentional long pauses. The speech appears to be a collection of random ideas and thoughts.

**(2) Poor:** Participant is able to speak continuously, but is only successful about half the time. The speech does not flow smoothly, and appears to have little direction or purpose. Participant often repeats ideas and may repeatedly flit between subtopics without any justification.

**(3) Fair:** For the most part, the participant is able to maintain the flow, even if they sound somewhat awkward and stall at times. Participant may occasionally repeat themselves, but demonstrate reasonable organization of ideas in their speech.

**(4) Good:** Participant is able to maintain the flow of the speech well, presenting his ideas in a logical manner. Participant uses appropriate illustrations or elaborates thoughts in an effective manner. Participant makes clear his opening and summary to the speech. No obvious deficits.

**(5) Very Good:** Participant easily maintains the logical flow of the speech, presenting main ideas of the speech in a well thought out framework. Participant introduces new ideas fluidly and frequently uses examples to ensure clarity. Participant demonstrates proficient use of syntax and appropriate vocabulary.

## Appendix G: Emotional Stroop Tasks

## WORD LIST #1

Faithful	Pleased	Agree
Relief	Like	Empathy
Caring	Happy	Beauty
Accept	Helpful	Perfect
Peaceful	Able	Success
Purpose	Serene	Positive
Brave	Passion	Glad
Awesome	Faith	Cheerful
Comfort	Proud	Fun
Content	Grateful	Pleasant
Warm	Nice	Active
Inspired	Secure	Friend
Graceful	Joy	Desire
Open	Gentle	Relaxed
Pleased	Amuse	Safe
Rejoice	Fair	Funny
Excite	Adore	Hope
Approve	Calm	Win
Joyful	Peaceful	Embrace
Loved	Love	Honour

## WORD LIST #2

Dread	Enrage	Wrong
Upset	Hate	Damage
Cold	Quit	Dirty
Annoy	Deny	Reject
Upset	Hurt	Decay
Negative	Corrupt	Jealous
Dead	Threat	Fear
Pain	Depressed	Never
Scary	Cruel	Poor
Guilt	Greed	Sick
Mean	Cry	Lost
Rude	Awful	Harmful
Angry	Tense	Boring
Fail	Sad	Cutting
Afraid	Fight	Lose
Alone	Oppress	Worry
Hard	Anxious	Death
Bad	Trouble	Defeat
Broken	Evil	Mad
Furious	Risk	Pissed



## WORD LIST #5

Coach	Boat	Water
Trace	Include	Itch
Group	Happen	Blanket
Mug	Sparkle	Shelf
House	Store	Mark
River	Breath	Bottom
Company	Top	Dinner
Guitar	Laptop	Automatic
Poultry	Many	Motion
Chair	Boxes	Screen
Tow	Helmet	Desk
Road	Wide	Window
Material	Airplane	Fork
Toaster	Coffee	Branch
Sweater	Pencil	Butter
Record	Books	Hair
Walking	Plant	Toe
Leg	Sound	Cheese
Watch	Driving	Lamp
Organic	Plate	Door

## Appendix H: Consent Form



Researcher:  
 Trevor Chiasson: Tx\_Chiasson@Laurentian.ca  
 Supervisor:  
 Dr. Cynthia Whissell CWhissell@Laurentian.ca

I, \_\_\_\_\_ am interested in participating in this psychological study, conducted by Trevor Chiasson and supervised by Dr. Cynthia Whissell. The purpose of this study is to compare stress reappraisal intervention techniques on state anxiety, physiology, and emotional bias to lead toward implications in psychological resilience, increasing performance, and to further stress reappraisal research.

**If I agree to participate**, my participation will consist of attending one 55-65 minute testing session, during which I will participate in filling out self-report questionnaires, reading three short summaries followed by answering a couple questions, activities. I agree to my blood pressure and heart rate being measured throughout the testing session. In addition, I will conduct a brief oral presentation and arithmetic task, in front of the researcher and **I consent to being videotaped during this part of the study**. None of my personal information will be disclosed, and complete anonymity will be assured. One hour's worth of bonus points (for applicable courses) will be awarded by disclosing my participation in this study to my professor and is disclosed to him/her at my own volition.

I understand that for some, giving oral presentations and being judged in the present moment may be stressful. If I am experiencing unusual stress, I will inform the researcher. My participation is **strictly voluntary and I may withdraw from the research at any moment with no penalty**.

I have also received assurance from the researchers that the information I will share will remain strictly confidential. **There are two copies of this consent form; one that the researchers keep, and one that I will keep**. All data will be kept for 7 years in a locked and secure cabinet within the residence of the researcher. Video recordings will be stored onto a laptop that is password protected and will remain in the possession of the researchers. I will also refrain from the discussing details about the testing session with other students to maintain the integrity of the study.

If I have any questions or concerns, I may contact Mr. Trevor Chiasson, Dr. Cynthia Whissell or Stephanie Harris (Laurentian Ethics) at SHarris2@laurentian.ca (705-675-1151 x 3681)

Participant's Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
 Researcher's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

I wish to receive a summary of the results of this study, which will be available by April 1<sup>st</sup>, 2017, at the following email address: \_\_\_\_\_

## **Appendix I: Debriefing Form**

### **Stress Reappraisal and its Effects on Emotional Bias, State Anxiety, Social Performance and Physiological Measurements**

The present study seeks to examine possible implications in using stress reappraisal intervention (a Cognitive Behavioural Therapy technique) for the resiliency towards experiences of social anxiety and anxiety in general, by changing a negatively biased cognitive schema on stress and stress arousal.

**The questionnaire you answered twice was the State Trait Anxiety Inventory (STAI), to measure subject accounts of state anxiety. Heart rate and blood pressure was recorded to duplicate previous results that show that a positive conceptualization of stress leads to benefits in physiology. The oral presentation and the arithmetic task was actually the Trier Social Stress Test, which is used to create mild psychological stress and arousal in participants. At the end was the emotional stroop tasks, this is done to see if different conceptualizations of stress lead to emotional bias towards emotional information.**

The overall purpose of this study is to explain to individuals that if they look at stress and stress arousal in a positive way, they may also see improvements in their physical health and mental health, but more specifically with performance anxiety. In accordance with the literature, a positive conceptualization of stress can also be a tool or a preventative measure that can help individuals cope with stress, which may lead to a better outlook on life and a better quality of life. This study may lead to further research in the prevention of other forms of mental illnesses that are heavily influenced by distress and emotional information. This study may also show how stress reappraisal intervention changes emotional affect through language.

“In stressful situations, like public speaking, our bodies react in very specific ways. The increase in arousal you may feel during stress is not harmful. Instead, these responses evolved to help our ancestors survive by delivering oxygen to where it is needed in the body. [I] encourage you to reinterpret your bodily signals during the following tasks as beneficial.” (Jamieson et al., 2013)

It is difficult to be subjected to psychological stress and your generosity and willingness to participate in this study is greatly appreciated. Your results will help contribute to the advancement of the field of stress reappraisal research and may lead to implications in psychological resilience. Sometimes people find stress and anxiety to be overwhelming. If participating in this study led you to feel distressed and you would like to speak to someone about your thoughts, please contact one of the following:

	<b>Phone Number</b>
<b>Laurentian’s Student Counselling Service</b>	<b>(705) 673-6506</b>
<b>Northeast Mental Health Centre</b>	<b>(705) 675-9192</b>
<b>Crisis Intervention</b>	<b>(705) 675 4760</b>

We would ask you to maintain confidentiality about the purpose of the experiment since any pre-knowledge of the purpose will bias the data for that person and thus cannot be used.

This study has been granted clearance according to the recommended principles of Canadian ethics guidelines and the Laurentian University Research Ethics Board.

**If you have any complaints, concerns, or questions about this research, please feel free to contact my primary supervisor Dr. Cynthia Whissell at CWhissell@Laurentian.ca. Any ethical concerns about the study may be directed to the Laurentian Office of Research Services at Ethics@Laurentian.ca**

**If you are interested in this area of research, you may wish to read the following references:**

Beck, A. T., & Dazois D. (2011). Cognitive Therapy: Current Status and Future Directions. *Annual Reviews of Medicine*, 62, Belmont, 397-409.

Jamieson, J., Nock, M, & Mendes, W. (2013). Changing the Conceptualization of Stress in Social Anxiety Disorder: Affective and Physiological Consequences. *Clinical Psychological Science*, XX(X), 1-12

Keller, A et al. (2012). Does the Perception that Stress Affects Health Matter? The Association with Health and Mortality. *Health Psychology*, 31(5), 677-684.

**Thank you very much for participating!**