

Stress and its Association with Emotional Regulation Success

I. Research Objectives:

The study focuses on examining how perceived stress relates to emotion regulation ability and success using self-report assessments and electroencephalography (EEG). This study aims to assess the relationship between an individual's stress level and their ability to successfully regulate negative emotions. Through an EEG experimental study, we will measure reductions in amplitude within the late positive potential (LPP) during regulatory trials from passive view trials of emotional stimuli as an indicator of regulatory success. Subjects would also be asked to self report their success in utilizing emotion regulation strategies. We hypothesize that individuals who report greater perceived stress would be less successful in regulating (i.e., greater LPP amplitude).

II. Literature Review:

Emotions include physiological reactions, subjective experiences, and physical behaviors (e.g. facial behaviors, gestures) in response to events in the external environment (Gross, 2015). Although emotions are prevalent in our day to day experiences, people may be motivated to change or alter what they are feeling. Emotion regulation often refers to the process in which individuals interpret, influence, and react to their emotional expressions and experiences through either conscious or unconscious processing (Gross, 2015). According to the Gross Process Model of emotion regulation (2015), there are different temporal stages in which an individual may modulate their emotions. Broadly, they fall under two domains, antecedent-focused strategies and response-focused strategies. Antecedent-focused strategies, such as situation selection (choosing where you want to be) or attentional deployment (shifting your attention), are ones that occur before the emotional response is fully elicited. An individual may have greater success in regulating before the emotion is fully elicited compared to response-focused strategies, in which individuals modulate after the emotion has occurred. In our proposed study, we focus on examining two antecedent-focused strategies: reappraisal and distraction.

The distinction between emotion regulation ability and emotion regulation success is relevant in our proposed study. Emotion regulation ability is often referred to as an individual's capacity to regulate changes in their emotion's intensity, duration and response (Gross & Thompson, 2007). Emotion regulation success, although related to an individual's ability, is measured on a case by case basis and not every case can be considered successful. Success can be measured as a decrease in late positive potential in an individual's EEG reading or a response in an individual's subject questionnaire stating that they were able to utilize a regulation strategy.

In our specific study, emotion regulation success is assessed through both objective and subjective measures, with subjects' self reported success and late positive potential (LPP) EEG readings as our objective measure.

Literature has shown that stress can lead to negative physical reactions and emotions in individuals (Wang & Saudino, 2011). The emotion, physical behavior, biological hormones, and health of individuals can be affected by stress. Stress is related to emotion regulation and emotion regulation includes the adjustment of stressful emotions. Stress is physically related to emotion regulation because the hypothalamic–pituitary–adrenal (HPA) axis produces hormones in response to stress. Cortisol, the byproduct of the HPA axis, can be predicted by emotion regulation (Gross, 2015). The neurological association between stress and emotion regulation is related to prefrontal lobe (PFC) which increases neural activity when individuals process stress and emotion regulation (Davidson, 2003). The limbic system including amygdala also makes contributions to coping of stress and emotion regulation (Kern et al, 2008).

A related study examines the relationship between stress and daily emotion regulation through diary reports and focuses on reports of emotional affects (Richardson, 2017). The study gathered data using a daily diary design that included Daily Stress, Daily Affect and Emotion Regulation Questionnaire for its participants. Findings show that as stress increased, participants reported higher levels of negative emotions and lower levels of positive emotions. For individuals who used suppression as their choice of emotion regulation strategy on days with higher stress, a larger negative impact on positive emotions was observed, indicating the negative role of stress on daily emotion affects (Richardson, 2017). While Richardson examined association between stress, emotional affects and regulation strategies through self report methods, we would like to extend his findings and explore association between stress and emotion regulation ability and emotion regulation success in a lab setting with both subject and objective measures to better understand their correlation.

Altogether, previous studies offer supportive evidence that stress is associated with emotion regulation, few studies have examined how perceived stress modulates neural physiological activity when responding and regulating emotion. Our study aims to examine the relationship between the factor of stress and individual emotion regulation success in terms of electronic signals measured by EEG to contribute to the current literature.

III. Research Questions

- Does perceived stress relate to an individual's perceived regulation ability and regulation success regarding negative emotions?

IV. Research Methods:

The study is a cross-sectional design that involves a questionnaire to assess emotion-based traits and an in-lab physiological and behavioral task. Participants are recruited through the SONA system. Once confirmed for eligibility, participants will be invited to partake in the experiment, which is a 2-hour long session where they will complete a survey and be instructed to use certain regulatory strategies in response to highly arousing negative images.

The online 30-minute survey assesses eligibility, demographics, mental health, emotion beliefs, reactivity, and regulation ability. The survey is comprised of many questionnaires and scales such as the Affect Valuation Index (Tsai, Knutson, & Fung, 2006), Evaluations of Emotions Scale (Markovich et al., 2016), Help vs. Hinder Emotion Questionnaire (Karnaze & Levine, 2018), Belief that you can control your emotions (De Castella et al., 2013), Emotion Regulation Questionnaire – reappraisal subscale (Gross & John, 2003), Emotion Regulation Distraction, Emotion Regulation Capacity Questionnaire – modified, Toronto Alexithymia Scale (Bagby, Taylor, & Parker, 1994), Trait Meta-Mood Scale (Salovey et al., 1995), Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983), and Attention check questions. These various measures allow us to collect subjective data that can be used for later analyses in comparison to the objective data that will be collected in the lab paradigm.

For the lab paradigm, participants will be shown a series of randomized images ranging from neutral to highly negative arousing images while having their neural activity recorded using EEG. The images chosen for the study are taken from the International Affective Picture System, a collection of images commonly used in experimental settings to elicit affect ranging in neutral, positive, and negative valence and arousal (in reference to IAPS; Lang, Bradley, & Cuthbert, 1999). The 120 images taken from this system are adapted from prior studies (in reference to Moser et al., 2010; Thiruchselvam et al., 2011), and consist of all highly arousing negative images ranging from fearful creatures, disease, disaster/war, mutilation, and violence.

Participants will be instructed to either view the images without changing how they feel, or be instructed to use two regulatory strategies - rethink or distract. The “rethink” condition (i.e., reappraisal) consists of participants viewing the negative viewing and changing how they view the image to reduce negative emotions that may arise from viewing the image. In the “distract” condition, participants are asked to think of something completely unrelated when viewing the image to reduce any negative emotions that may arise from viewing the image. After each image is shown, participants will be asked to rate their negative and positive emotions as well as their perceived success in regulating.

To examine our first research question, we will test associations between perceived stress with regulation ability from the questionnaire and with reductions in LPP amplitude (comparing passive viewing of negative images to regulation of negative images) during the lab task. For our

second research question, we will test associations between perceived success and reductions in LPP amplitude in the regulation task.

At the end of the study, participants will be debriefed and checked for emotional distress. Participants will also be compensated for their time with either extra credit or \$10.

V. Itemized Budget

Proposal Budget		
Item	Budgeted Amount	Explanation and Justification for Expense
Participant Compensation	\$750	Based on the power analysis, we anticipate needing a minimum of $N = 55$ participants. We hope to recruit up to $N = 75$ to account for noisy or missing data. We will compensate participants \$10 per person for their participation.
Poster printing	\$150	Printing poster for Spring UROP symposium
Total Budget	\$900	

VI. Timeline

Spring 2022

- Literature review
- Data collection

Summer 2022

- Literature review
- Data collection

Fall 2022

- Literature review
- Data collection

Winter 2023

- Data collection
- Data processing/cleaning
- Running analyses

Spring 2023

- Finalizing analyses
- Writing-up results and poster for presentation

VII. Responsibilities

We will be responsible for recruiting subjects, running EEG sessions, collecting data, analyzing and interpreting data, and reporting our findings.

VIII. References

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- Wang, M., & Saudino, K. J. (2011). Emotion Regulation and Stress. *Journal of Adult Development*, 18(2), 95–103. <https://doi.org/10.1007/s10804-010-9114-7>