Past Projects

Does Emotion-Modulated Startle Predict the Course of Major and Minor Depression?
*Project leader: April Clift (Dissertation)*

The startle response is a defensive reflex to an aversive stimulus that is generally quantified in humans by the magnitude of the eye blink response. Emotion modulation of startle denotes that the magnitude of the startle reflex ordinarily varies as a function of the affective foreground. Among healthy individuals, startle responses are potentiated during negative affective states and inhibited during positive affective states. Startle responses of depressed individuals appear to be similar across all affective foregrounds.

In collaboration with Dr. David Drobes, we utilize the emotion-modulated startle paradigm to examine whether emotional reactivity will predict the course of depression. Specifically, we follow a sample of major and minor depressed individuals, as well as controls, to determine whether emotion-modulated startle responses at Time 1 will predict remission of depression at Time 2, six months later. We predict that individuals who show the normative pattern of emotional reactivity at Time 1 will be more likely to experience recovery by Time 2.

The Effect of Stress on Hedonic Capacity in Generalized Anxiety Disorder: A Prospective Experimental Study of One Potential Pathway to Depression
*Project leader: Bethany Morris (Master's Thesis)*

The project examines how stress can induce behavioral anhedonia, or reduced responsiveness to reward, which is associated with MDD. The study investigates whether this effect is increased in individuals with GAD, who are at risk for developing depressive symptoms, as well as whether stress-induced anhedonia predicts future depression symptoms.

Does Goal Generation and Pursuit Vary as a Function of Depressive Status?
*Project leader: Lindsay Brauer (Master's Thesis)*

This study is an examination of goal generation as a function of depressive status, as examined in individuals who are currently depressed, remitted-depressed, and in those who have never been depressed. In addition, we seek to examine factors that may mediate the relationship between depressive status and goal generation.

Emotion-Modulated Startle and the Severity and Course of Depression
*Project leader: April Clift (Master’s Thesis)*
The startle response is a defensive reflex to an aversive stimulus that is generally quantified in humans by the magnitude of the eye blink response. Emotion modulation of startle denotes that the magnitude of the startle reflex ordinarily varies as a function of the affective foreground. Among healthy individuals, startle responses are potentiated during negative affective states and inhibited during positive affective states. Studies conflict as to whether major depressive disorder (MDD) is associated with deficits in emotion-modulated startle.

To clarify whether deficits in emotion-modulated startle are a biomarker of syndromal MDD, in collaboration with Dr. David Drobes we are examining startle during affective picture-viewing among individuals with syndromal MDD, subsyndromal MDD, and among asymptomatic individuals. It is hypothesized that syndromal MDD will be characterized by deficits in emotion-modulated startle, whereas subsyndromal MDD will be characterized by intact startle modulation similar to that of asymptomatic controls. Moreover, it is also hypothesized that deficits in emotion-modulated startle will predict a worse six month MDD course. This project is designed to examine whether blunted startle indeed represents a risk factor for more severe and more long-lasting disorder and whether deficits in startle modulation represent an enduring trait-like factor that confers vulnerability to repeated episodes of MDD.

**Emotional Reactivity to Daily Events in Major and Minor Depression**

*Project leader: Lauren Bylsma (Master’s Thesis)*

Based in part upon the prevalent assumption that moods facilitates emotions when the mood and emotion are matching in valence, researchers have suggested that negative mood in MDD may potentiate negative emotional reactions. However, research examining the effect of depression on emotional reactivity has been mixed. There is some evidence that subclinical levels of depression may lead to increased negative reactivity. However, for clinical levels of depression, such as those seen in MDD, there is evidence from recent empirical research that both positive and negative emotional reactivity is actually blunted, as demonstrated by a recent meta-analysis (Bylsma & Rottenberg, manuscript under review). The blunting of emotional reactivity in MDD is predicted by the Emotion Context Insensitivity (ECI) hypothesis (Rottenberg, 2005), which predicts blunted emotional reactivity in dependent of valence. This view is derived from evolutionary accounts of depression that characterize depression as disengagement with the environment. The idea of negative mood facilitation (i.e. that negative mood potentiates negative emotional reactivity) may be relevant to low levels of depressed mood, but not at more severe levels of depressed mood.

To clarify the relationship of depression to emotional reactivity, this study will examine emotional reactivity across varying levels of depression severity. This study can help to elucidate whether the symptoms of depression are best conceived as occurring along a continuum (i.e., minor dysphoria to severe depression) or a discrete disease state defined by the diagnostic threshold of MDD. Furthermore, this study can inform our understanding of emotion in regard to whether ordinary negative affect is distinct in its
properties from the more severe negative affect present in MDD. The relationship of depression severity to positive and negative emotional reactivity to daily life events will be examined using the day reconstruction method (DRM) and the computerized experience sampling method (ESM). The ESM and DRM methods measure emotional reactivity in naturalistic settings and hence may have higher ecological and external validity than laboratory assessments, and may afford more samples of behavior than can be obtained in a typical laboratory setting, potentially providing a more reliable estimate of emotional reactivity.

The Effects of Slow Breathing Training on RSA and Response to Stress

**PI’s:** Kristen Salomon and Jonathan Rottenberg

**Project coordinator:** Lauren Bylsma

Brief biofeedback or slow breathing training sessions have been shown to produce short-term changes in RSA (respiratory sinus arrhythmia) and cause long-term health and performance benefits in a variety of ways in which autonomic function plays a role. It is thought that RSA reflects autonomic balance and helps an individual react to stressors. Low RSA may reflect autonomic dysregulation, while those with high RSA may have better autonomic regulation and adaptive functioning.

In this project, we are collaborating with Dr. Kristen Salomon to investigate whether biofeedback techniques to manipulate RSA can produce antidepressant effects. Specifically, we will use slow breathing training techniques to train participants to breathe at their resonant frequency, which results in resonance between cardiac rhythms associated with respiration and those caused by baroreflex activity (related to blood pressure). This results in the system achieving maximum flexibility and adaptability which is proposed to help an individual respond to various stressors and may have implications for treatment of depression.

Depression and Cardiac Vagal Control

**PI’s:** Jonathan Rottenberg and Kristen Salomon

Cardiac vagal control is a biological parameter linked to self-regulation that has attracted considerable attention as a possible etiological marker for several forms of psychopathology, including depression. Activity in the vagus nerve influences beat-to-beat changes in heart rate. Cardiac vagal control can be assessed indirectly with electrocardiogram measures of the variability in cardiac interbeat intervals that correspond with respiration. Two major aspects of cardiac vagal control are: (1) Vagal Level (VL), usually measured in a resting state, and (2) Vagal Fluctuation (VF; i.e., fluctuations in vagal level) usually measured in response to changing environmental demands. Indeed, accumulating evidence suggests that VL and VF are distinct constructs that independently predict physical and mental health outcomes. A growing literature demonstrates that high VL and context-appropriate VF are associated with behavioral flexibility and adaptability, and, in turn, that low VL and a lack of context-
appropriate VF are associated with poor self-regulation and several forms of psychiatric impairment. Low VL and a lack of VF are both plausible liability markers for MDD.

In collaboration with Dr. Kristen Salomon, the general aim of this project is to investigate abnormalities in vagal fluctuation as a liability marker for depression. The specific aims of this project are to examine whether depression vulnerability is associated with deficient VF and whether preserved VF predicts recovery from depression. We predict that compared to healthy never-depressed person, currently depressed and formerly depressed person will exhibit less VF in response to experiential stressors. Furthermore, currently depressed persons who preserve VF in response to experimental stressors will be the most likely to recover from the disorder by a six month follow up.
