Typically, early postpartum females have lower anxiety compared to nulliparous females, but some postpartum women (and laboratory rats) experience elevated anxiety after giving birth that interferes with mother-infant interactions and socioemotional development of offspring. This peripartum anxiety is strongly predicted by previous high anxiety in humans and maternal rats. Although the neurobiological mechanisms associated with differences in anxiety among mothers is unclear, central GABA neurotransmission has been implicated in anxiety in nulliparous and randomly-selected postpartum females. In the current study, we selected 8 low-anxious and 8 high-anxious female rats based on the time spent in the open arms of an elevated plus maze on postpartum day 7. We then analyzed protein expression of GAD$_{65}$ (responsible for synthesis of GABA released from terminals), and the vesicular GABA transporter (vGAT; responsible for uptake and storage of GABA into vesicles) in the medial prefrontal cortex (mPFC), an area associated with emotion regulation. We found a negative correlation between vGAT expression in the mPFC and the number of open arm entries driven by the high-anxious females. We also found a trend suggesting a positive correlation between GAD$_{65}$ expression and open arm time in the low-anxious females. There was no relationship between vGAT expression and open arm entries, nor between GAD$_{65}$ expression and anxiety, in the high-anxious females. There was no association between vGAT expression and open arm time nor GAD$_{65}$ and anxiety in the low-anxious females. These data suggest that differential cortical GABA regulation may contribute to behavioral differences between high- vs. low-anxious mothers.

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RESEARCH AND TRAVEL PLAN

Please consider my request for a travel award from the Michigan State University Post Doctoral Association to participate in the International Society for Developmental Psychobiology Conference in San Sebastian, Spain July 20-23, 2015. This travel award will supplement funds necessary to participate in this conference that features symposia on maternal behavior presented by prominent researchers in my field. My attendance at this meeting would be an invaluable opportunity to attend a conference in my specific field of research that will not only expose me to new research by important scientists in Neuroscience, but it will also offer networking opportunities and a way to showcase my work, thus preparing me as an independent researcher in behavioral neuroscience. Because this is such a specialized conference, I will have a better opportunity to interact with fellow scientists than I would at much larger conferences, and this ease of interaction can help foster new collaborations for my future faculty position at Colgate University that begins Fall 2015. I consider this conference my “home” conference, where my research has been well-received and highly supported by the audience. In fact, the editor of Developmental Psychobiology invited to develop a special issue on my symposium from 2014. After attending this meeting, I will share my experiences and feedback along with my colleagues at Michigan State University to keep others abreast of current research and to help prepare my current data for publication.

For most women, the postpartum period is usually a time of tremendous excitement and joy. Unfortunately, almost 20% of postpartum women experience elevated anxiety that hinders both mother and infant wellbeing. It is well-known that maternal care during early-life is crucial for proper emotional and social development of offspring. The underlying causes behind this postpartum anxiety are still not completely understood, and current treatments are not sufficient as many women either do not respond to typical anti-anxiety drugs or cannot take some medications because they are unsafe for children who are breastfed. Dysregulation of neurotransmitters in the brain has been highly implicated in anxiety, yet these mechanisms are still unclear. To better understand individual susceptibility to anxiety and its physiological mechanisms of onset later in life, it is crucial to examine early behavioral measures as well as the neurochemistry behind these disorders. My research interests involve better understanding of biological and behavioral risk factors for postpartum anxiety disorders using a rodent model.

I earned an NIH postdoctoral training grant to study individual differences in maternal behavior and anxiety in Dr. Joseph Lonstein’s laboratory. This grant primarily covers my stipend and health insurance, however travel to conferences is not included. Dr. Lonstein is an expert in studying the neurobiological underpinnings of postpartum maternal and anxiety behaviors and has trained several successful students. While most of Dr. Lonstein’s work has focused on effects of postpartum anxiety across individuals, I focus on risk factors within individuals providing both novel and important research that answers different scientific questions. Stemming off of my graduate work, my primary research interests in Dr. Lonstein’s lab are to determine environmental, behavioral, and neurochemical predictors of individual differences in anxiety and maternal behavior outcomes. In a previous study published in Neuroscience, I found that anxiety before pregnancy is highly predictive of anxiety during the early postpartum period, especially if females are denied contact with their offspring before an anxiety test. Offspring presence was also related to norepinephrine (a stress chemical) in the brainstem suggesting that these differences in postpartum anxiety are related to neurochemical content and pre-partum anxiety-related behavior. In the current study I will present, I investigated how pre-pregnancy anxiety plays a role in individual differences in postpartum anxiety and maternal behavior found later in life with a particular focus on brain GABA systems. GABA is the major inhibitory neurotransmitter in the brain, and has been implicated in anxiety in non-mothers and randomly-selected postpartum females. Here, I examined protein expression of mechanisms involved in reuptake and synthesis of GABA in high- vs. low-anxious postpartum female rats and found that these mechanisms functioned differently in these groups. These data may help to explain neurochemical differences in high- vs. low-anxious human mothers and may identify future anti-anxiety targets to further investigate.

At Michigan State, my training has involved manipulations and observations of maternal behavior and anxiety to better understand risk factors for human mental health disorders associated with pregnancy and the postpartum period. My experiences have very dramatically expanded my research abilities methodologically and intellectually. Unique training opportunities along with this award will help me to be successful as an independent researcher focusing on biological and behavioral factors involved in individual differences in postpartum anxiety at Colgate University. These opportunities will also help me make significant contributions to the understanding of neurobiology, emotions, and mental health. Your consideration for this award is greatly appreciated.

Estimated costs: Registration: $110.00; Airfare (kayak.com, 4/27/15): $1327; Accommodations: $354.65.