A substantial literature documents a strong association between childhood poverty and lifetime morbidity as well as premature mortality. Although parents are instrumental in creating their children's early environments, poverty imposes adversity on both children and parents. In this new research project, "Prenatal Pathways for Poverty's Influence on the Brains of Two Generations," funded by NIH, we aim to investigate a question – how early poverty gets into brains of new mothers and their babies.

Cumulative risk is considered as one of key pathways by which poverty influences health. Poverty is associated with environmental risk factors including more stressful life events (e.g. family turmoil, neighborhood violence, discrimination, residential and food insecurity) and physical stressors including living in noisy, overcrowded, and substandard quality housing. Poverty is also linked to multiple biological risk factors including dysregulation of the hypothalamic–pituitary–adrenal (HPA) axis and autonomic nervous system, also known as the allostatic load.

Although individuals of any socioeconomic status can be exposed to these risk factors, those in poverty are far more likely to be exposed to multiple risks at any given time. In the current study, we examine whether prenatal exposure to cumulative risk is a pathway by which the adverse effects of poverty are transmitted to fetuses during gestation. Moreover, this prenatal exposure to cumulative risk may also perturb a mother's neural adaptation to parenting, which further increases the infant's likelihood of receiving harsh parenting postnatally.
For the next 5 years, we will prospectively study a sample of low- and middle-income pregnant women and their infants. Exposure to poverty and cumulative prenatal risk will be assessed in each trimester (12, 22, and 32 weeks gestation). Shortly after the infant's birth, neuroimaging of the infant and the mother will be performed to assess fetal brain development (using MRI, DTI, resting-state fMRI) and maternal neural adaptation to parenting during pregnancy (using fMRI). We hope that the findings of the study can offer scientific evidence to support prenatal intervention to reduce exposure to cumulative risk among low-income pregnant women.

**Alumni Matters**

Lydia Prado, PhD  
Clinical Psychology, Class of 1995

Dr. Lydia Prado is the Vice President of Child & Family Services at the Mental Health Center of Denver, including five outpatient sites and one resource center.

Dr. Prado promotes the development of prevention and early intervention strategies, the establishment of community-based partnerships, staff development, and transformation of traditional delivery models for work with diverse populations. Dr. Prado values community and inclusivity in her work and these values came to life as she worked collaboratively to bring to fruition the Dahlia Campus for Health and Well-Being

Dahlia Campus for Health and Well-Being is an innovative community-informed center in Northeast Park Hill that promotes well-being across the lifespan. The site features an inclusive preschool, a full service dental clinic for children, a one acre urban farm, 5,400 square foot aquaponics greenhouse, horticultural therapy spaces, community gardens, teaching kitchen, community room, gymnasium and a full array of mental health services for all ages. **Dr. Prado's work and this dynamic community campus were recently featured on the PBS Newshour.**


**Teaching Matters**

By Chip Reichardt, PhD  
Professor

Here is a parable attributed to the thirteenth century.

**Learning to be Silent**

The pupils of the Tendai school used to study meditation before Zen entered Japan. Four of them who were intimate friends promised one another to observe seven days of silence.
On the first day all were silent. Their meditation had begun auspiciously, but when night came and the oil lamps were growing dim one of the pupils could not help exclaiming to a servant: "Fix those lamps."

The second pupil was surprised to hear the first one talk. "We are not supposed to say a word," he remarked.

"You two are stupid. Why did you talk?" asked the third.

"I am the only one who has not talked," concluded the fourth pupil.*

Before you read further, please write down what the parable means: What was the author trying to teach?

I use this exercise in class. Students come up with a wide variety of explanations. Some people believe the lesson is that people are not very proficient at being silent, or controlling impulses, or being mindful of their own behavior. Some see the parable as an example of our desire to out-perform others or succeed where others fail. Others see the opposite: even partial success is a significant accomplishment. One student interpreted the word "learning" in the title of the parable as emphasizing that we are forever students rather than masters, and we continually need to practice even simple skills such as being silent. Alternatively, some believe the lesson is that if one person fails, the group fails. Still other students believe the point of the parable is that when you pay attention to others, you don't pay attention to yourself. The list goes on.

After we compile a reasonable list of interpretations in my class, I ask the students how many interpretations each one of them identified. Throughout the years, I've found that most students stop with a single interpretation, even though the list of plausible interpretations is quite long. Did you, like most people, stop with one interpretation or did you continue to hypothesize after that first one came to mind?

This exercise illustrates the powerful human tendency to stop once we have an interpretation or explanation in hand rather than to go on to consider additional interpretations or explanations. This tendency to stop hypothesizing once we have a plausible explanation can be disadvantageous, especially if the first explanation you come up with is not as good as others you might have come up with, if only you had not stopped. So be wary of stopping after you come up with just one explanation.

And be especially wary of stopping if the first explanation you come up with is highly plausible. Then the tendency to stop is all the greater. Yet some of the most significant breakthroughs in science (e.g., the theories of relativity, germs, evolution, continental drift, and the earth rotating around the sun) were deemed highly implausible at first. So don't rule out explanations just because they appears implausible on the surface. Otherwise we might never get to the truth.
This year I have had the opportunity to work closely with faculty and graduate student researchers in the Automaticity, Affect, Control & Thought Lab (AACT Lab), and the Visual Perception, Emotion, and Cognition Laboratory (VPEC Lab). My tasks have included literature review, running participants, engaging in analysis, and thinking critically about research questions.

In March, I attended a lecture offered by Dr. Adam Anderson who visited campus as a Marsico Visiting Scholar. This lecture exposed me to essential studies that are part of the research foundation of my work in the AACT and VPEC labs. Dr. Anderson’s lecture focused on answering questions surrounding human eyes and how they operate as senders and receivers of emotional information. His team’s methodical approach to answering these questions led them to gather detailed measurements of eyes in response to well-controlled stimuli developed by computer models. This research was engaging and fundamentally increased my understanding of emotional faces as stimuli.

The opportunity to engage with important figures in our area of study and interest is an area that I believe the University of Denver takes great pains to ensure we have. As an undergraduate student in the Department of Psychology, such events give me the opportunity to diversify my interests and increase foundational knowledge that will be important to my later transition to graduate school. I implore all DU students to take advantage of these opportunities while here, whether they are in your major or just of topics interest. In life after DU, we will find few opportunities to interact with experts across diverse fields of study.

Dr. Anderson gave me insight into how to think about eyes as senders and receivers of emotional stimuli. I can now think more critically regarding my labs’ research questions and more effectively generate my own. I would like to thank Dr. McRae and the AACT Lab, Dr. Sweeny and the VPEC, and specifically Danny Lumian for all giving me the opportunity to expand my experiences and knowledge in their labs and on their research teams.