

The Vulnerable Child: Environment, Health, Development

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10/29/2017



From Clinician to Researcher

Education

- **BA/BSN** – U. of Rochester, Psychology/ Nursing
- **MSN/MPH/PNP** - Columbia University, Public Health, Nursing
- **PhD Epidemiology**, UC Berkeley School of Public Health

Work Experience

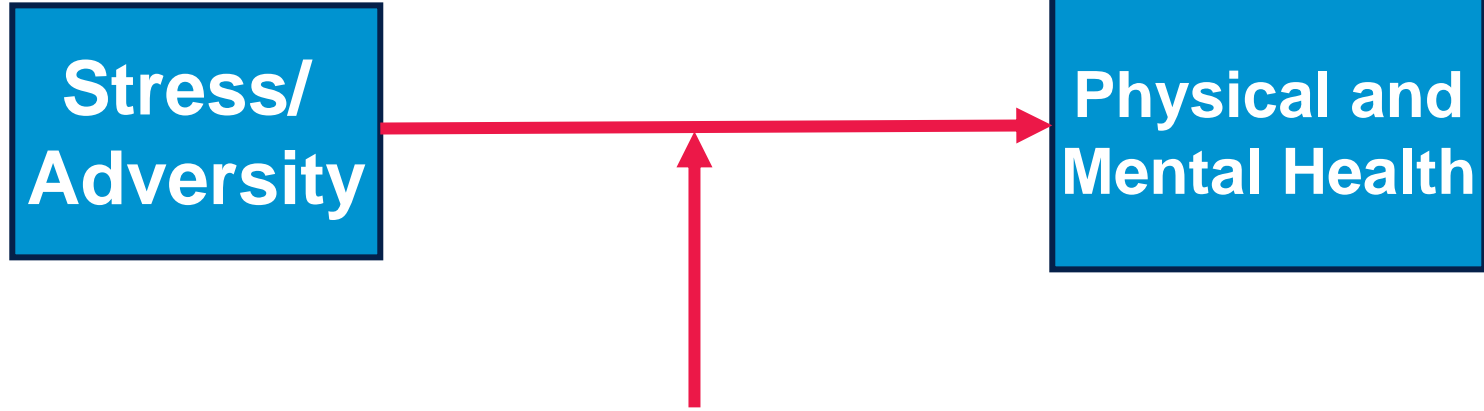
- Visiting Nurse Association
- UCSF Ambulatory Care Clinics
- UCSF Clinical Professor
- NICHD Study Project Coordinator
- UCSF Professor School of Nursing
 - Director, California Child Care Health Program
 - Investigator, Center for Children's Environmental Research and Children's Health (CERCH), UC Berkeley

Interdisciplinary Collaborators

- W. Thomas Boyce, MD, MPH, UCSF Professor
- Asa Bradman, PhD, Environmental Epidemiologist, UCB
- Nicki Bush, PhD, Clinical Psychologist, UCSF Professor
- Brenda Eskenazi, PhD, Neuropsychology Epidemiologist, Professor, UC Berkeley School of Public Health, Children's Environmental Research and Children's Health (CERCH)
- Julianna Deardorff, PhD, Clinical Psychologist, Professor, UC Berkeley School of Public Health, CERCH
- Marilyn Essex, PhD, Sociologist, Professor, U. of Wisconsin
- Eva Roder, MD, Ulm University, Germany



- There is a weak relationship between experiencing stress/ adversity and health outcomes.
- Stress does not always explain why some children have physical and mental health problems.
- Children's ability to deal with stressors may differ.



Individual Differences:

**Autonomic Nervous System
(ANS)**



**Sympathetic
Nervous System**

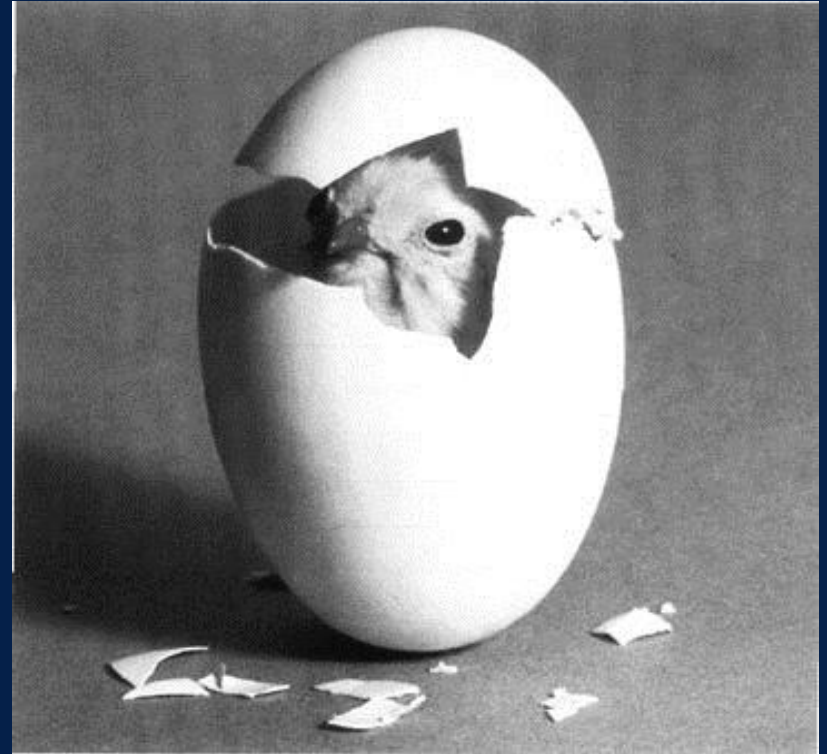
**Parasympathetic
Nervous System**

Children: Unique, Vulnerable, Resilient

- There are sensitive periods of children's development.

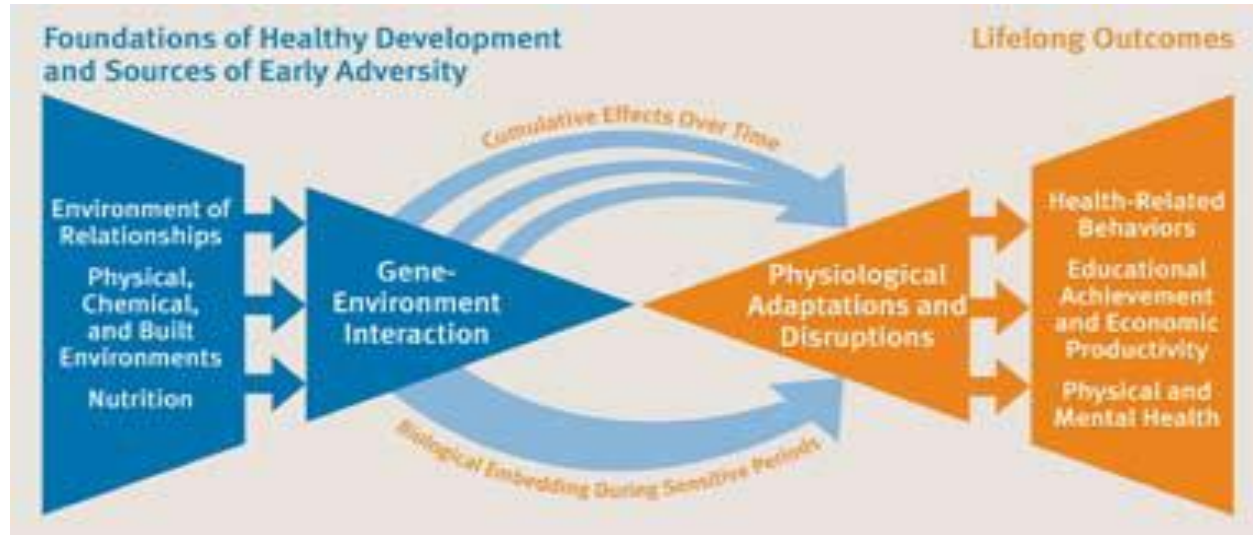
Hertzman, C & Boyce WT (2010)

- There are unique characteristics of young children – physical, mental, emotional.
- Children are vulnerable.
- Children are resilient.



A Biodevelopmental Framework

How Early Experiences Get into the Body

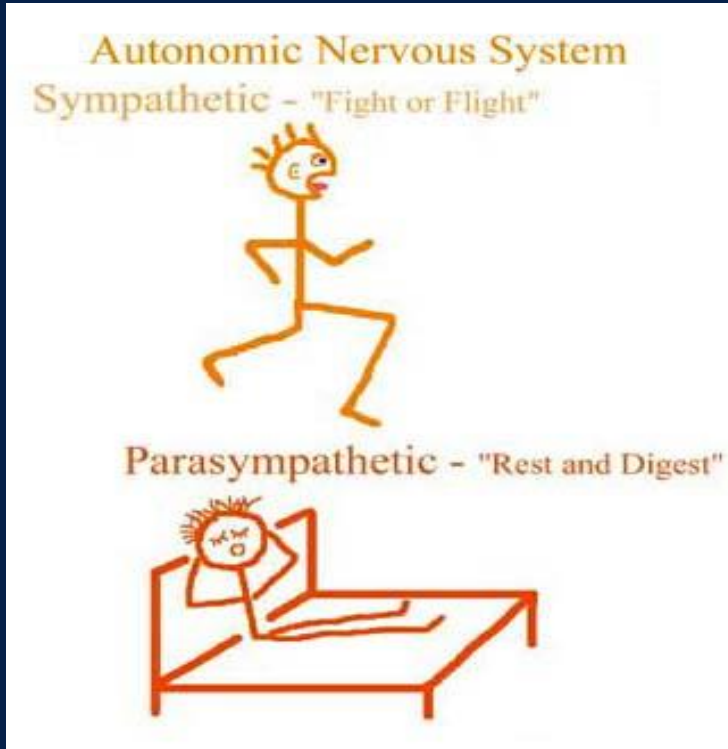


Shonkoff, J.P., "Building a New Biodevelopmental Framework to Guide the Future of Early Childhood Policy." *Child Development*, January/February 2010, 81 (1): 357–367.

Biologic Sensitivity to Environmental Adversity

- Not all children are equally susceptible to adverse environmental experiences.
- Biologically sensitive children are particularly responsive to stressful *and* nurturing experiences (Boyce, 2007; Boyce & Ellis, 2005)
- Children with heightened sensitivity can thrive under conditions of adversity if they also experience maternal sensitivity or high quality environments (home, child care).
- Children who experience repeated and chronic adversity can have dampened biologic sensitivity to challenges.

Autonomic Nervous System



- **Sympathetic (SNS)**
 - Excitatory; 'fight or flight'
 - Dilates pupil
 - Inhibits salivation
 - Increases heart rate
- **Parasympathetic (PNS)**
 - Restorative; 'rest and digest'
 - Constricts pupil
 - Stimulates salivation
 - Slows heart rate

Research Goals

- To identify children's physiologic responses to stress
- To identify the individual differences in children's physiologic responses to stress
- To determine if children who experience adversity early in life have different risks of health problems (mental, physical) depending on their physiologic responses to stress
- To improve the quality of child care environments by providing nurse-led interventions using national health and safety standards
- To reduce young children's exposure to environmental hazards (pesticides)

Research Questions

- Do children who experience more adversities (few routines, major life events) have more sleep problems than children who experience fewer adversities?
- Does autonomic nervous system (ANS) reactivity moderate the relations between family adversities and children's sleep problems?



Ref: Alkon, et al., (2017) *Frontiers in Public Health*. Doi:10.3389/pubh.2017.00155

ANS Reactivity

- Resting

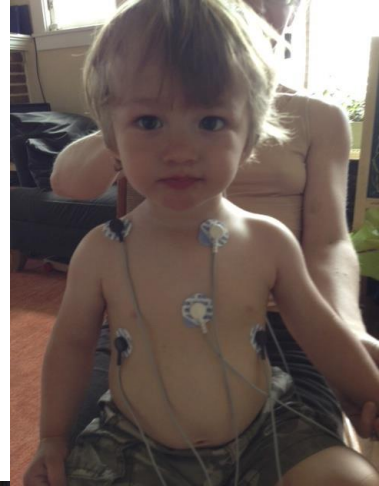
- Read stories before and after the challenging tasks

- Challenges:

- Social, cognitive, physical,
emotional

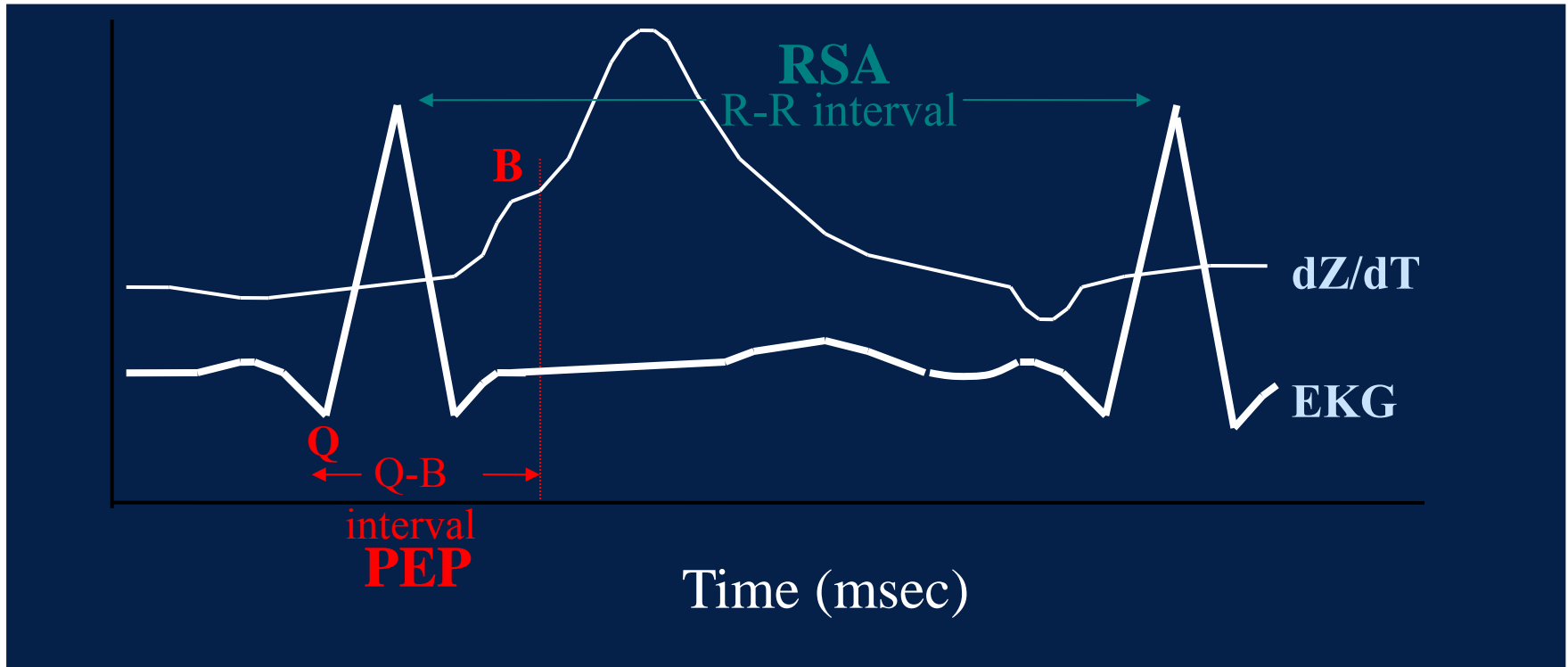
- Reactivity

- Difference Score = mean of
challenges minus 1st rest

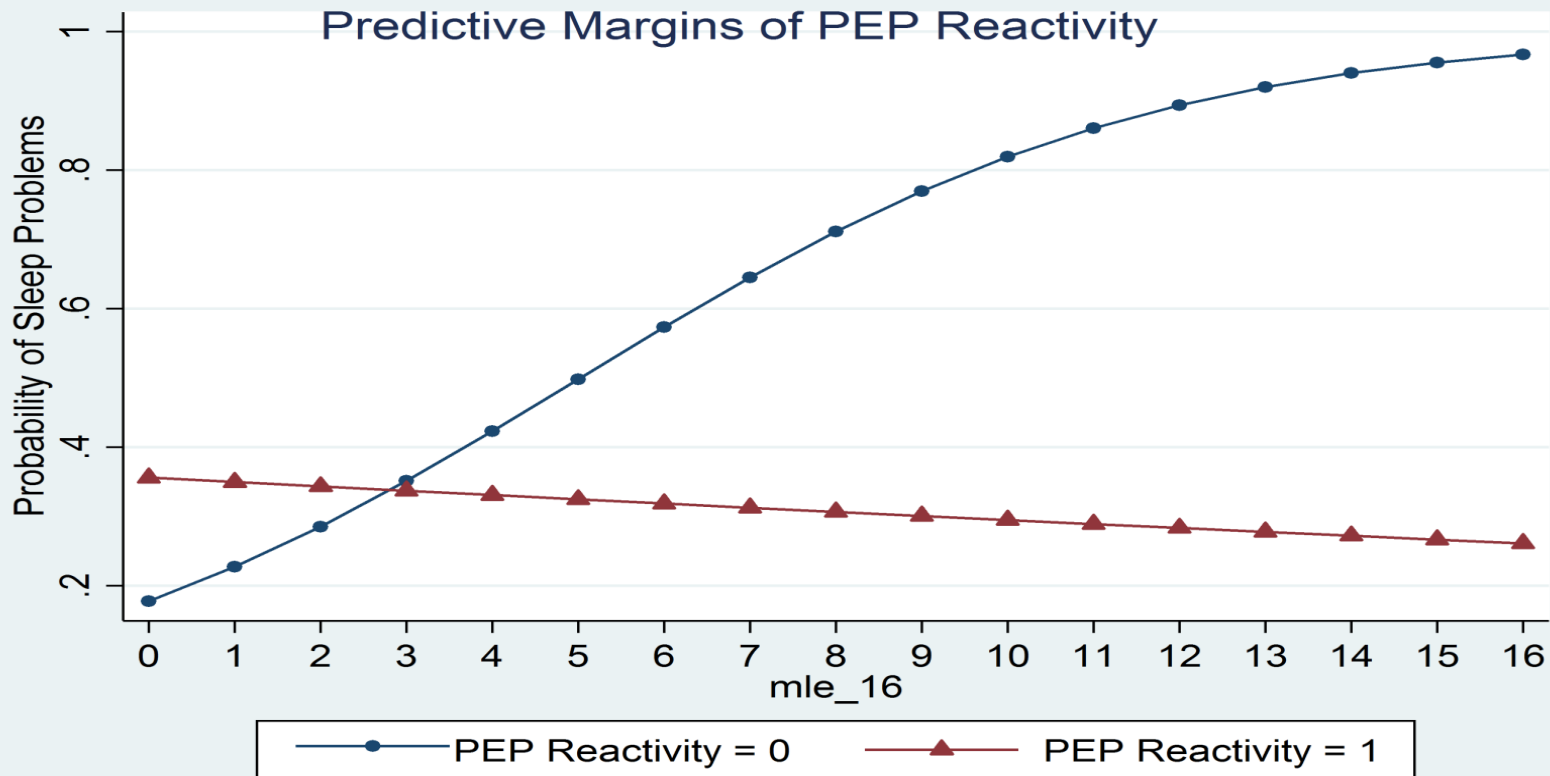


ANS Measures

Pre-ejection Period (Sympathetic Nervous System) and Respiratory Sinus Arrhythmia (Parasympathetic Nervous System)



PEP Reactivity Moderates Relations Between Family Major Life Events and Children's Sleep Problems (n=277)



Results Summary

- Five-year old Latino children whose families had daily routines of eating family meals and reading together had fewer sleep problems than children whose families did not have these daily routines, after controlling for children's exposure to major life events and ANS reactivity.
- Five-year old Latino children who had low ANS reactivity (SNS) and also experienced multiple family stressful events during the last 18 months were at risk of having more sleep problems than children with low ANS reactivity and who experienced few family stressful events.

Interventions, Conclusion, Future

- **Interventions** to improve preschool-age children's sleep hygiene for Latino families should:
 - Include the importance of family routines
 - Target children with low ANS reactivity
- **Conclusion**
 - Improving preschool-age children's sleep will reduce the prevalence of later health problems, obesity, learning, and mental health problems.
- **Future research**
 - To identify young children at risk and develop effective interventions to reduce their morbidity and improve their life course.



Overall Summary

- There are sensitive periods during a child's development which affect their autonomic nervous system.
- There are individual differences in how children physiologically respond to their environment.
- Children's trajectory in life can be influenced by their positive or negative environmental experiences.



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