Maine Chapter

INCORPORATED IN MAINE

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN®

30 Association Drive, Box 190
Manchester, ME 04351
office: 207-622-3374

www.maineaap.org

Good Morning, Senator Rotundo, Representative Gattine, Members of the Joint Standing Committee On Appropriations and Financial Affairs, Senator Ingwersen, Representative Meyer and Members of the Joint Standing Committee on Health and Human Services.

My Name is Deborah Hagler. I have practiced pediatrics in Maine for 27 years. I reside in Harpswell, Maine. I co-chair the Maine Chapter of the American Academy of Pediatrics Committee on Healthy Mental Development. Thank you for hearing testimony from the Maine AAP Chapter.

It is during the 3rd trimester that the brain loses its smooth appearance and begins to take on the characteristic folds that produce the very recognizable landmarks of the human brain. At the microscopic level connections (called synapses) are being established between nerve cells at an approximate rate of 700 new synapses per second. By birth the average brain weighs about 350-400 grams[1] and is growing gangbusters- most rapidly in the first 2 years such that by kindergarten the human brain is about 90% of its adult size.[1,2] Early experiences fuel the formations of neuronal connections, growth, and are critical for the development of the human brain.[3] Over the last several decades research has discovered many of the key details of this undertaking and the importance environmental factors in this process from the role of a loving enriching environment to the challenges presented by infections, nutritional deficiencies environmental neglect, and various forms of childhood trauma.

Childhood trauma exposes the developing brain to elevated levels of the stress hormone cortisol which changes production of microRNA altering production of cellular proteins in the brain and prevents the addition of chemical groups to proteins on DNA preventing the production of proteins.[3,4] Chronic neglect decreases input into the system that enhances the functional and structural development of the brain. Data from the Bucharest Early Intervention Project studied and followed infants and toddlers for a 12-year period that had randomly been assigned to foster care or to remain in institutional care at different time periods in their developmental trajectory. Using PET Scans, MRI scans and EEG testing changes in brain functioning and structure overtime were demonstrated. Children remaining in institutional care (a proxy for environmental neglect) showed reductions in metabolism in areas that were critical for emotional control and cognitive functioning and brain imaging studies showed an overall decrease in brain volume in those raised in an institutional environment.[5] This study also demonstrated subsequent changes or "recovery" to more normalized structure and function when children were placed into an adoptive or foster care setting- highlighting the profound plasticity of the developing brain. The earlier the intervention the better the recovery. Timing matters. [5,6]

Children growing up exposed to toxic stress or in under-resourced environments can begin school with significant disadvantages in language use, vocabulary, emotional regulation and executive function and the research shows that this can be mitigated by providing good quality childcare programs and resources.[4] Nobel prize winning economist Dr. James Heckman has studied the economics of early childhood extensively. Estimates for every dollar invested in early childhood programming can yield from 4-9 dollars in return. [7] The Maine Chapter of the American Academy of Pediatrics is opposed to cuts that would decrease access to HeadStart and diminish funding to attract a well-trained qualified child educator workforce. A Harvard neuroscientist said our nature needs nurture. Maine and its children need and deserve access to the most robust early childhood system of support for their development and all our futures.

Deborah Hagler, MD
Maine AAP Healthy Mental Development Committee, Co-Chair

1.Nelson C, de Haan M, Thomas K. Neuroscience of Cognitive Development, The Role of Experience and the Developing Brain; 2006; John Wiley and Sons. Hoboken NJ.

2.https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/brain-weight

3.National Research Council (US) and Institute of Medicine (US) Committee on Integrating the Science of Early Childhood Development; Shonkoff JP, Phillips DA, editors. From Neurons to Neighborhoods: The Science of Early Childhood Development. Washington (DC): National Academies Press (US); 2000. 6, Communicating and Learning. Available from: https://www.ncbi.nlm.nih.gov/books/NBK225547/

4.Babenko O, Golubov A, Ilnytskyy Y, Kovalchuk I, Metz GA. Genomic and epigenomic responses to chronic stress involve miRNA-mediated programming. PLoS One. 2012;7(1):e29441. doi: 10.1371/journal.pone.0029441. Epub 2012 Jan 24. PMID: 22291890; PMCID: PMC3265462.

5.Bick J, Nelson CA. Early experience and brain development. Wiley Interdiscip Rev Cogn Sci. 2017 Jan;8(1-2):10.1002/wcs.1387. doi: 10.1002/wcs.1387. Epub 2016 Dec 1. PMID: 27906514; PMCID: PMC8103659.

6. Als H, Duffy FH, McAnulty GB, Rivkin MJ, Vajapeyam S, Mulkern RV, Warfield SK, Huppi PS, Butler SC, Conneman N, Fischer C, Eichenwald EC. Early experience alters brain function and structure. Pediatrics. 2004 Apr;113(4):846-57. doi: 10.1542/peds.113.4.846. PMID: 15060237.

7. The Heckman Equation
Invest in Early Childhood Development, Reduce Deficits, Strengthen the Economy