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## BIOGRAPHICAL SKETCH

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NAME: **Heidi M Feldman**

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eRA COMMONS USER NAME (credential, e.g., agency login): FELDMANHEIDI

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POSITION TITLE: Professor of Pediatrics, Division of Neonatal & Developmental Medicine, Stanford University

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### EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
University of Pennsylvania, Philadelphia, PA	BA	06/1970	Psychology
University of Pennsylvania, Philadelphia, PA	PhD	06/1975	Developmental Psychology
University of California, San Diego, CA	MD	06/1979	Medicine
University of California, San Diego, CA	Residency	06/1982	Pediatrics
Children's Hospital Boston, Boston, MA	Fellowship	06/1983	Ambulatory Pediatrics
Children's Hospital Boston, Boston, MA	Fellowship	06/1984	Child and Family Development

### A. Personal Statement

I am a board-certified developmental-behavioral pediatrician and developmental psychologist. Throughout my research career, I have conducted clinical and translational studies of children with or at risk for disorders of language, reading, and cognition, including children with deafness, chronic ear infections, autism, and brain injury. Since arriving at Stanford in 2006, I have focused on children born preterm who are at risk for difficulties in language, cognition and reading and for differences in structural features of long-range white matter pathways in the brain. In addition, I have participated in research on health services through the American Academy of Pediatrics and DBPNet, a research consortium of 14 academic health centers, with a focus on Attention-Deficit/Hyperactivity Disorder (ADHD). An important component of my professional activity is education and training. I have served as Project Director of several federally funded training grants, including Leadership Education in Neurodevelopmental Disabilities Grant at the University of Pittsburgh, a General Internal Medicine/General Pediatrics training grant at the Children's Hospital of Pittsburgh, and Leadership Education in Developmental-Behavioral Pediatrics, a fellowship grant at Children's Hospital of Pittsburgh and at Stanford University. I am currently mentoring two junior faculty members on federally funded career development awards. I have enjoyed the opportunity to provide leadership in several national organizations, including serving as Program Chair for the Section on Developmental-Behavioral Pediatrics at the American Academy of Pediatrics, chair of the Developmental-Behavioral Pediatrics Sub-Board at the American Board of Pediatrics and President of the Society of Developmental and Behavioral Pediatrics.

### B. Positions and Honors

#### **Positions and Employment**

2006-present Professor, Pediatrics, Stanford University, Stanford, CA

1984-2006 Assistant to Full Professor, Pediatrics, University of Pittsburgh, Pittsburgh, PA

#### **Other Experience and Professional Memberships**

2007-2012 Member, Behavioral and Biobehavioral Science Subcommittee, Eunice Kennedy Shriver NICHD

2006-present Ballinger-Swindells Endowed Prof of Developmental-Behavioral Pediatrics, Stanford University

2006-2010 Liaison from SDBP, Subcommittee on Attention-Deficit/Hyperactivity Disorder, Revision of ADHD Guidelines, American Academy of Pediatrics (AAP)

2001-2006	Ronald L and Patricia M Violi Professor of Pediatrics and Child Development, Children's Hospital of Pittsburgh
2000-2001	Vice Chair for Faculty and Program Development, Department of Pediatrics, University of Pittsburgh School of Medicine
1998-present	Member, American Pediatrics Society
1996-present	Senior Member, Society for Pediatric Research
1996-2001	Member, Comm on Quality Improv Subcom on Attention-Deficit/Hyperactivity Disorder, AAP
1995-1996	Member, Society for Pediatric Research
1994-2000	Member, Committee on Psychosocial Aspects of Child and Family Health, AAP
1993-2001	Division Chief, General Academic Pediatrics, Children's Hospital of Pittsburgh
1992-1997	Member, Human Development and Aging, III Study Section NIH
1990-1993	Program Chair, Section of Developmental and Behavioral Pediatrics, AAP
1989-1991	Acting Director, Down Syndrome Center, Children's Hospital of Pittsburgh
1987-1993	Division Chief, Child Development Unit, Children's Hospital of Pittsburgh
1986-1987	Interim Director, Department of Communication Disorders, Children's Hospital of Pittsburgh
1986-present	Fellow, AAP
1984-1987	Director, Child Development Unit, Children's Hospital of Pittsburgh

### Honors

2016	Stanford University Department of Pediatrics Clinical Research Award of Excellence
2012	C Anderson Aldrich Award, American Academy of Pediatrics
2006	Ballinger-Swindells Distinguished Professorship of Developmental and Behavioral Pediatrics
1999	Awardee, National Pediatric Faculty Development Scholars Program
1999	Chancellor's Distinguished Teaching Award, University of Pittsburgh

### **C. Contribution to Science**

- 1. The development of a communication system by deaf children of hearing parents.** Children typically learn the language of their parents and community. But, what if no model is available? This longitudinal observation study asked how do children learn to communicate in the absence of a language model. We found that deaf children of hearing parents who are not exposed to sign language nonetheless create a manual-gestural system called "home sign". It is a structured system that includes many features of spoken language. Susan Goldin-Meadow and I collaborated equally as PIs on the project and we used the data to fulfill requirements for our PhD dissertation. *This study contributed to theories of language development, demonstrating that communication can develop from general cognitive and social functions. It also had implications for intervention for children who are deaf; given that the children will sign, it is advisable to teach them a sign language that has all of the features of natural verbal languages. This research spawned many studies on the development of home sign in different countries and cultures.*

  - Goldin-Meadow S & **Feldman HM**. The development of language-like communication without a language models. *Science*, 1977, 197(4301), 401-403.
  - Feldman, HM**, Goldin-Meadow S, & Gleitman L. Beyond Herodotus: The creation of language by linguistically deprived deaf children. In Lock, A. (Ed.), *Action, Symbol, and Gesture: The Emergence of Language*. London: Academic Press, 1977.
- 2. Resilience of language in children with focal left-hemisphere injury.** In adults the left hemisphere serves language function. An unanswered question was whether an intact left hemisphere is necessary to learn language. I designed a longitudinal observational study to evaluate language acquisition in children with prenatal or early injuries to the usual left hemisphere neural substrate for language. The study showed that children with injuries to either hemisphere showed mild-to-moderate initial delays and then near-normal rates of development. At older ages, they showed delays in the understanding of complex syntax and slow speed of processing, despite normal intelligence and language scores. Functional neuroimaging studies found activations during language processing either in right hemisphere homologous regions or left hemisphere peri-lesional regions. *These studies documented plasticity for language learning after left hemisphere brain injury. The resulting theory about language learning in the brain is that multiple areas of the brain beyond the left hemisphere are important for launching the learning process. Language learning itself contributes to sculpting the brain for language areas. Though a predilection for organizing the left hemisphere for language is present, alternative neural organizations are possible when the left hemisphere injury precludes its participation in language learning.*

- a. **Feldman HM**, MacWhinney B, Sacco, K. Sentence Processing in Children with Early Unilateral Brain Injury. *Brain and Language*, 2002, 83, 335-352.
  - b. Booth JR, MacWhinney B, Thulborn KR, Sacco K, Voyvodic J, **Feldman HM**. Developmental and lesion effects in brain activation during sentence comprehension and mental rotation. *Developmental Neuropsychology*, 2000, 18, 139-169.
  - c. MacWhinney B, **Feldman HM**, Sacco K, Valdez-Perez R. Online measures of basic language skills in children with early focal brain lesions. *Brain & Language*, 2000, 71, 400-431.
  - d. **Feldman HM**, Holland AL, Kemp SS & Janosky JE. Language development after unilateral brain injury. *Brain and Language*, 1992, 42, 89-102.
3. **Otitis media does not cause delays or disorders in development.** Prior to this research, the assumption that chronic otitis media with effusion compromised development of language and other domains was used to justify surgical intervention to relieve the effusion. This study addressed the question, “Do chronic ear infections cause delays or disorders in language, speech, cognition, academic skills, or behavioral characteristics?” The novel feature of the study was the use of a randomized controlled trial of early versus delayed/no tympanostomy tube placement for children with chronic otitis media in order to address the issue of causality. The study enrolled 6350 children who were less than 2 months of age and followed them monthly for the presence of otitis media until they turned 3 years of age. All of the children were evaluated with an age-appropriate comprehensive battery at 3, 4, 6, and 9-11 years of age. As the co-PI of the study, my role was to construct the outcomes measures, contribute to analysis and interpretation of data, and participate in manuscript preparation. The results showed that early placement of tympanostomy tubes did not alter any of the outcomes at any of the ages. *Largely based on the results from this series of studies, a joint committee of the American Academy of Pediatrics, the American Academy of Family Physicians, and the American Academy of Otolaryngology, Head and Neck Surgery changed the practice guidelines for the management of chronic otitis media. The research contributed to understanding the resilience of language development in the face of mild and intermittent hearing loss from middle ear effusion.*
- a. Paradise JL, **Feldman HM**, Campbell TF, Dollaghan CA., Rockette HE, Pitcairn DL, Smith CG, Colborn DK, Bernard BS., Kurs-Lasky M, Janosky JE, Sabo DL, O’Connor RE, and Pelham WE. Early or Delayed Insertion of Tympanostomy Tubes and Developmental Outcomes at Nine to Eleven Years of Age. *New England Journal of Medicine*, 2007, 356(3):248-61.
  - b. Paradise JL, Campbell TF, Dollaghan CA, **Feldman HM**, Bernard BS, Colborn DK, Rockette HE, Janosky JE, Pitcairn DL, Kurs-Lasky M, Sabo DL, Smith CG. Effect of early or delayed insertion of tympanostomy tubes for persistent otitis media on developmental outcomes at age 6 years. *New England Journal of Medicine*, 2005, 353, 576-586.
  - c. Paradise JL, **Feldman HM**, Campbell TF, Dollaghan CA, Colborn DK, Bernard BS, Rockette HE, Janosky JE, Pitcairn DL, Sabo DL, Kurs-Lasky M, Smith CG. Early versus delayed tympanostomy-tube placement for persistent otitis media: Developmental outcomes at age 3 years. *New England Journal of Medicine*, 2001, 344, 1179-1187.
  - d. **Feldman HM**, Dollaghan C, Campbell T, Kurs-Lasky M, Janosky JE, Paradise JL. Measurement properties of the MacArthur Communicative Development Inventory at ages 1 and 2 years. *Child Development* March/April 2000, 71:2, 310-322.
4. **Properties of the white matter in the brain are associated with language and reading outcomes in children born preterm.** Prematurity affects 10% of US children. Approximately 50% of children born very or extremely preterm are at risk for neurodevelopmental disorders, including disturbances of language, cognition and reading. Children born preterm are also at risk for injuries to the white matter of the brain. Diffusion MRI (dMRI) is particularly well suited to characterizing the white matter. This observational study combined behavioral and neuroimaging assessments, including dMRI, to determine whether adverse outcomes of prematurity might be associated with disturbances in white matter. *The results of this study documented that children born preterm have particular difficulties in linguistic processing speed, verbal memory, and reading comprehension. Group differences in white matter microstructure between children born preterm and full term are stable over childhood. We found unexpectedly that children born preterm had higher fractional anisotropy of the white matter on dMRI than children born at term in selected pathways. We have also demonstrated that language and reading outcomes of prematurity are associated with white matter properties. In the domain of reading, our results suggested that the underlying neurobiology of good and poor reading in children born preterm may be different from the neurobiology of reading in otherwise healthy children. A spin-off of the main*

study was the development of an automated method of white matter analysis, called Automated Fiber Quantification or AFQ. This method reduces the time and labor required for the evaluation of white matter properties and makes it more feasible to use diffusion as a clinical tool. The analytic programs have been made publicly available to encourage their use at different centers.

- a. Dodson CK, Travis KE, Borchers LR, Marchman V, Ben-Shachar M, **Feldman HM**. White matter properties associated with pre-reading skills in 6-year-old children born preterm and full-term. *Developmental Medicine and Child Neurology*, in press
  - b. Travis KE, Adams JN, Kovachy VN, Ben-Shachar M, **Feldman HM**. White matter properties differ in 6-year old Readers and Pre-readers. *Brain structure & function*. 2017; 222(4):1685-1703
  - c. Travis KE, Ben-Shachar M, Myall, NJ, **Feldman HM**. Variations in the Neurobiology of Reading in Children and Adolescents born Full Term and Preterm. *NeuroImage: Clinical*, 11, 2016, 555-565
  - d. Travis KE, Yael Leitner, **Feldman HM**, Ben-Shachar M. Cerebellar white matter pathways are associated with reading skills in children and adolescents. *Human Brain Mapping*, 2015, 36(4),1536-53.
5. **Developmental-behavioral pediatrics emphasizes family-centered individualized care to children with a wide range of high prevalence and high-severity disorders.** Developmental-behavioral pediatrics is a relatively new subspecialty in pediatrics; it provides direct care for children with disabilities and leadership within pediatrics to improve treatment and support for children with delays and disorders and their families. *I served as an Editor to the premier textbook in the field and have participated in the development and dissemination of practice guidelines for Attention-Deficit Hyperactivity Disorder. I also authored a recent book outlining an approach to health care for children with disabilities that recommends that we conceptualize health care for these children as a means to allowing them to be included and make contributions to their families, schools, neighborhoods, and communities. I am a member of the Executive Committee of DBPNet, a research network in my field.*
- a. Carey WB, Coleman W, Crocker AC, Elias E, and **Feldman HM** (Eds) *Developmental-Behavioral Pediatrics, Fourth Edition*. Philadelphia, PA: Elsevier, 2009, 1060 pages, ISBN 978-4160-3370-7
  - b. **Feldman HM**. *Redesigning Health Care for Children with Disabilities: Strengthening inclusion, contribution, and health*. Baltimore MD: Brookes Publishing, 2013, 280 pages.
  - c. **Feldman HM** and Reiss MI. Clinical Practice. Attention-Deficit/Hyperactivity Disorder in Children and Adolescents. *New England Journal of Medicine*, 2014, 370(9): 838-46.
  - d. Feldman HM, Blum NJ, Gahman A, Shults J. Diagnosis of Attention-Deficit/Hyperactivity Disorder by Developmental Pediatricians in Academic Centers: A DBPNet Study. *Academic Pediatrics*, Published Online: November 06, 2014 DOI: <http://dx.doi.org/10.1016/j.acap.2014.09.004>.

#### **Complete List of Published Work in MyBibliography:**

<http://www.ncbi.nlm.nih.gov/sites/myncbi/1Hm2OgZmNgrQR/bibliography/47769351/public/?sort=date&direction=ascending>

#### **D. Research Support**

##### **Ongoing Research Support**

Feldman (PI) 07/01/2015 – 06/30/2018

LPCH

*First 5 San Mateo Special Needs Project ITN*

The goal of this project is designed to improve developmental screening, evaluation, and treatment for children birth to 5 years of age in San Mateo County, California.

T77MC097960201 Feldman (Project Director) 07/01/2008 – 06/30/2018

Public Health Service, HRSA

*MCH Leadership Education in Developmental-Behavioral Pediatrics*

This training grant prepares developmental-behavioral pediatrics fellows, residents, and practicing physicians for leadership roles in family-centered, culturally competent, scientifically justified developmental health care.

Children's Health Research Institute (PI) 12/01/2015 – 11/30/2018

Stanford University

*Cerebellar Circuitry in Development, learning, and clinical disorders*

The goal of this transdisciplinary grant is segment and describe the properties of the three major white matter pathways that link the cerebellum to the cerebrum.

**Completed Research Support**

RO1-HD069162 Feldman (PI)

07/25/2012 – 05/31/2017

NIH/NICHHD

*Poor Reading in Preterms: Neural Basis, Prediction, & Response to Intervention*

The goal of this project is to determine whether children with poor reading abilities who were born preterm have the same behavioral profile, neural basis and response to treatment as children born at term with comparable reading ability.

R01 HD069150 Feldman (PI)

04/01/2011-03/31/2016

NIH/NICHHD

*Predicting Language Outcomes from Early Processing Efficiency in Preterm Children*

The goal of this research longitudinal grant is to establish whether novel approaches to evaluating language skills in young children born preterm at ages 18 and 24 months are successful at predicting which children will have language delays at age 4 years.

Feldman (PI)

10/01/2013 – 09/30/2014

CHRI-Spectrum Child Health Administration

*Innovations in Patient Care (IPC)*

Feldman (PI)

07/01/2007–06/30/2013

*First 5 Special Needs Project*

The goal of this project is designed to improve developmental screening, evaluation, and treatment for children birth to 5 years of age in San Mateo County, California.

Role: PI

T77MC097960201 Feldman(Project Director)

07/01/2008–06/30/2013

Public Health Service, HRSA

*MCH Leadership Education in Developmental-Behavioral Pediatrics*

This training grant prepares developmental-behavioral pediatrics fellows, residents, and practicing physicians for leadership roles in family-centered, culturally competent, scientifically justified developmental health care.

11PH-010-1210-2986 Feldman (PI)

01/01/2012–01/31/2015

The Gerber Foundation

*Deep Soft Tissue Manipulation for Children with Spastic Cerebral Palsy*

The overall goal of this study is to determine whether Myofascial Structural Integration improves gross motor function and other selected developmental capacities in young children with spastic cerebral palsy.

**Pending Research Support**

None