CURRICULUM VITA

Name: Richard L. Canfield

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Education

B.Sc.	University of Puget Sound, 1980 Major: Psychology Minors: Mathematics, Literature
M.A.	University of Denver, 1984 Developmental Psychology
Ph.D.	University of Denver, 1988 Developmental Psychology

Employment History

2017-Present	Senior Research Associate II, Division of Nutritional Sciences Cornell University, Ithaca, NY
2014-Present	Consulting Psychologist, International Food Policy Research Institute
2011-2017	Visiting Fellow, Division of Nutritional Sciences Cornell University, Ithaca, NY
2011-2014	Science Advisor, USEPA (Spec. Gov. Employee)
2000- 2011	Senior Research Associate II, Division of Nutritional Sciences Cornell University, Ithaca, NY
1997- 2000	Associate Professor, Department of Human Development Cornell University, Ithaca, NY

1990-1997	Assistant Professor, Department of Human Development Cornell University, Ithaca, NY
1988-1990	NIMH Postdoctoral Fellow, Department of Human Development Cornell University, Ithaca, NY

National Advisory Work

US EPA Science Advisory Board Member
Clean Air Scientific Advisory Committee: Integrated Science Assessment for Lead (2011-2014)

Office of Pollution Prevention and Toxics: Childhood Lead Exposure (2010-2011)

External Scientific Advisory Board
Children's Environmental Health Center Grant Mt. Sinai Medical Center (2003-2005)

Neurodevelopmental Assessment Advisory Panel
National Children's Study (2004)

Advisor on Childhood Lead Neurotoxicity (Cognition and Behavior)
USEPA Region 5: Office of Strategic Environmental Analysis (2003-2006)

Research Grants:

2018-2021	HATCH Research Grant "Effects of Increased Maternal Choline Intake on Infant Cognitive Development" (Co-PI with B. Strupp: $104,991)
2018-2020	Egg Nutrition Center Grant Effects of Increased Maternal Choline Intake on Infant Cognitive Development" (Co-PI with B. Strupp: $50,000)
2017-2020	Africare Research Support "Optimized PUFA-RUTF Study" to support a double-blind clinical trial comparing neurocognitive outcomes in Malawian children with severe acute malnutrition randomized to treatment with either the current standard of care ready-to-use therapeutic food (RUTF) or one of two alternative RUTFs with optimized PUFA profiles. (PI: $343,282)
2017-2019	Balchem Corporation Research Grant "Effects of Maternal Choline Supplementation on Child Cognition, Affect, and Hypothalamic-Pituitary-Adrenal (HPA) Axis Reactivity" (Co-PI with B. Strupp: $72,409)

2015-2018	HATCH Research Grant “Beneficial Effects of Increased Maternal Choline Intake on Child Cognition & Temperament” (Co-PI with B. Strupp: $84,745)
2007-2010	HATCH Research Grant “Non-invasive assessment of mother-infant interactions” (Co-PI with J. Haas: $60,000)
2004-2009	NIH/NIEHS ES-03-004 “Inner City Toxicants: Child Growth and Development” (subcontract with Mt. Sinai School of Medicine: $15,000)
2000-2005	NIEHS R01 ES411676 “Factors modifying the toxicity of methyl mercury in a fish eating population. (subcontract with U of Rochester School of Medicine: $411,224)
2003-2008	NICHD R01 HD044430 “Congenital HHV6 infection: characteristics and outcome.” (subcontract with U of Rochester School of Medicine: $431,995)
2003-2006	EPA STAR Award “The effects of the World Trade Center disaster on pregnant women and their infants.” (subcontract with Mt. Sinai School of Medicine: $83,409)
2003-2004	NIEHS SBRP WTC Supplement: “Effects of WTC disaster on pregnant women and their infants.” (subcontract with Mt. Sinai School of Medicine: $38,950)
1996-2001	NIEHS R01 ES08388 “Neurobehavioral effects of low-level lead exposure in children” (subcontract with University of Rochester School of Medicine and Cincinnati Children’s Hospital Medical Center: $2,112,630)
1996-1997	College of Human Ecology "Seed" and Innovation Grant Program "Dimensions of infant information processing" ($6,000)
1994-1995	College of Human Ecology "Seed" and Innovation Grant Program "Environmental lead and children's intellectual development" ($7,000)
1993-1995	Life Course Institute Innovative Research Award "A bio-ecological analysis of environmental lead (Pb) on infant intellectual development" ($11,000)
1992-1994	HATCH Research Grant "Mechanism and function of social contingency in mother-infant interaction" ($10,000)

1988-1990	NIMH RO3 MH45298 “Infant Visual Anticipation & Number Perception" ($24,901)

Research/Professional Interests:

My overarching scholarly goals, which are to generate knowledge and understanding of developmental change in perceptual, cognitive, and related neurobehavioral functions during human infancy and early childhood, and to use this knowledge to improve children's health, well-being, and developmental potential. My work includes studies of normative development and also studies of the impacts of environmental factors that influence developmental processes and outcomes. The environmental factors I have focused on most are prenatal and early postnatal exposure to neurotoxins (lead, methylmercury, phthalates, and organophosphates) and nutrients (choline, DHA, iron, zinc). My work and accomplishments in these areas are described below.

Normative Development

My early work on infant perception and cognition focused on developing a new method for studying expectancy formation and processing speed using oculomotor responses. This work produced the first demonstration that infants only 2 and 3 months old rapidly form expectancies for asymmetric stimulus sequences after seeing only a few repetitions of a spatiotemporally predictable array of images. Key to this work is the measurement of anticipatory saccades that reveal an infant's prediction of the location of the next image in a sequence. This behavior, because it occurs in the absence of a concurrent stimulus, can be directly interpreted as an endogenously generated expectancy, which distinguishes it from violation-of-expectation measures that rely on the inference that longer looking at an "impossible" event actually means the infant expected to see an event consistent with physical laws. I was able to extend this work to show that young infants can form an expectancy based on the number of images seen in one location to predict when an image will occur in another location; i.e., develop number-based expectations. This provides the most unambiguous demonstration of counting-like behavior in young infants and serves as a key finding that informs current theories of numerical cognition.

My own work then focused on the possible utility of the oculomotor control paradigm as an index of developmental status in infants and toddlers and learned that infants' latencies to initiate a visually-guided saccade to a peripheral target is a highly sensitive index of growth in processing speed throughout infancy. In a monograph dedicated to this work I demonstrated through nonlinear growth curve modeling of longitudinal data gathered monthly from infants 2- through 12-months of age that saccade latency, a measure of reaction time (RT), declined in a highly lawful manner that is well-described by an asymptotically-limited exponential decay function. Remarkably, the growth curve describing age-related change in RT is highly similar to growth curves based on electrophysiological indices (visual evoked potential, and auditory brainstem response), and also for growth curves for brain myelination during the first year of life. I examined the psychometric adequacy of measures of oculomotor control in my monograph and related work and showed that the RT measure demonstrates short-term reliability over weeks and long-term stability of individual differences throughout much of infancy. Indeed, the RT measure showed greater long-term stability than any other measure of infant cognition. Others have demonstrated that infant RT in a saccade paradigm predicts individual differences in cognitive function measured during early childhood. I have recently used this measure in an RCT of maternal

choline supplementation and found that infants of mothers assigned to a higher choline diet were consistently faster to react to peripheral stimuli across the 4-13 month age period, compared to infants of mothers assigned to the lower (but still adequate) choline intake diet.

1. Canfield, R. L. & Haith, M. M. (1991). Young infants' visual expectations for symmetric and asymmetric stimulus sequences. ***Developmental Psychology****, 27*(2), 198-208.
2. Canfield, R. L., Wilken, J., Schmerl, L. & Smith, E. G. (1995). Age-related change and stability of individual differences in infant saccade reaction time. ***Infant Behavior and Development****, 18*, 351-358.
3. Canfield, R. L., Smith, E. G., Brezsnyak, M. P., & Snow, K. L. (1997). Information processing through the first year of life: A longitudinal study using the visual expectation paradigm. ***Monographs of the Society for Research in Child Development****, 62*, 1-145.
4. Canfield, R. L., & Smith, E. G. (1996). Number-Based Expectations and Sequential Enumeration by 5-Month-Old Infants. ***Developmental Psychology****, 32*(2), 269-279.
5. Canfield, R. L., & Kirkham, N. Z. (2001). Infant Cortical Development and the Prospective Control of Saccadic Eye Movements. ***Infancy****, 2*(2), 197-211
6. Caudill, M. A., Strupp, B. J., Muscalu, L., Nevins, J. E. H. & Canfield, R. L. (2017). Maternal choline supplementation during the third trimester of pregnancy improves infant information processing speed: a randomized, double-blind, controlled feeding study. ***FASEB J****.:* doi:10.1096/fj.201700692RR

Pediatric Lead Exposure

My work on the use of oculomotor control measures as indices of individual differences in infant developmental status betrayed a growing desire to contribute to work on the role of environmental factors in shaping cognitive development in infancy and throughout life. Thus I became deeply involved researching the effects of early lead exposure on cognitive development in children. With collaborators at the University Of Rochester School Of Medicine and a colleague at Cornell, we secured NIH funding for a 5-year prospective cohort study to follow 200 infants living in an area of Rochester who were at risk for elevated blood lead levels. As the developmental psychologist on the study I designed the neurobehavioral assessment and trained and monitored staff collecting data in Rochester, while also supervising data coding, data reduction, and statistical analysis in my lab at Cornell. This became an exceptionally influential project, the results of which were instrumental in changing national and international public health policies regarding acceptable blood lead levels in young children. Most importantly, we showed that low blood lead levels in children were not safe. We reported that for children with chronic low blood lead, children who never attained a blood lead concentration as high as the existing CDC level of concern of 10 ug/dL, there was a striking decline in IQ scores associated with increments in blood lead. Moreover, my previous work in nonlinear growth curve modeling spurred me to look at my data on lead exposure and child IQ somewhat differently than others. As a result, our research was the first empirical publication to use a newly-developed statistical method allowing for semiparametric mixed-model regression. Using this analytic tool allowed me to show a very counter-intuitive finding with substantial relevance to public health. We demonstrated a

nonlinear dose-response function indicating that increments in blood lead concentrations in the low blood lead range are more damaging to children's intellectual function than increments at higher blood lead levels. Our nonlinear analysis encouraged other researchers to re-analyze their data using nonlinear methods and this culminated in lead-exposure investigators from around the globe to pool their data for an international pooled analysis to focus on the shape of the dose-response of lead and child IQ. The result of this project was clear confirmation of our original analysis and a radical change in perspective on the adverse effects of even slightly elevated blood lead concentrations in young children. This changed perspective has been percolating through the medical and public health policy arenas to produce changes in regulations and guidelines for all the leading medical societies and regulatory agencies. My own work on the EPA Science Advisory Board contributed to a new *Integrated Science Assessment for Lead* in which the estimate for the dose-effect of lead on children's IQ scores is based on our data and on re-analyses of previously published data that were inspired by our methodology. Today, millions of children are being protected from damaging levels of lead exposure that were widely considered "normal" prior to our work and the efforts of many other scientists and policymakers. Finally, my more recent research into the effects of early exposure to environmental toxins has produced highly influential papers showing that prenatal phthalate exposure adversely affects executive functions during childhood and that prenatal organophosphate exposure is linked to poorer cognitive outcomes in childhood.

1. Canfield, R.L., Henderson, C.R., Cory-Slechta, D.A., Cox, C., Jusko, T.A., & Lanphear, B.P., (2003). Intellectual impairment in children with blood lead levels below 10 μg/dL: The Rochester cohort study. ***The New England Journal of Medicine***, *35*(2), 63-78.
2. Canfield, R.L., Gendle, M.H., & Cory-Slechta, D.A. (2004). Impaired neuropsychological functioning in lead-exposed children. ***Developmental Neuropsychology***, *26*(1), 513-540.
3. Lanphear, B., Hornung, R., Khoury, J., Yolton, K., Baghurst, P., Bellinger, D.C., Canfield, R.L., Dietrich, K.N., Bornschein, R., Greene, T., Rothenberg, S.J., Needleman, H.L., Schnaas, L., Wasserman, G., Graziano, J., and Roberts, R. (2005). Low-level Environmental Lead Exposure and Children's Intellectual Function: An International Pooled Analysis. ***Environmental Health Perspectives***, *113*(7), 894–899.
4. Jusko, T. A., Henderson, C. R., Lanphear, B. P., Cory-Slechta, D. A., Parsons, P. J., & Canfield, R. L. (2008). Blood lead concentrations < 10 microg/dL and child intelligence at 6 years of age. ***Environmental Health Perspectives****, 116*(2), 243-248.
5. Engel SM, Miodovnik A, Canfield RL, Zhu C, Silva MJ, Calafat AM, Wolff MS (2010). Prenatal phthalate exposure is associated with childhood behavior and executive functioning. ***Environmental Health Perspectives***, *118*, 565-571.

Effects of prenatal and early postnatal nutritional interventions on infant and child neurobehavioral outcomes.

Over the past several years the focus of my work has shifted to understanding the effects of early nutritional interventions on infant and child development. This goal is pursued through combined study of normative developmental processes in the context of variations in prenatal

and early postnatal environmental factors that impair or enhance child outcomes. My current research is now fully focused on understanding the effects of early nutritional interventions on infant and child neurobehavioral development. This research is being conducted in the context of three funded projects that investigate the cognitive, affective, and/or neuroendocrine effects of (1) maternal choline supplementation, (2) feeding iron and zinc biofortified pearl millet to 12-18 month old infants, and (3) feeding novel, PUFA-enhanced, ready-to-use therapeutic foods (RUTFs) to treat toddlers suffering from severe acute malnutrition (SAM). In each case, these studies utilize randomized control designs comparing an experimental supplement or food to a relevant usual standard of care.

1. Caudill, M. A., Strupp, B. J., Muscalu, L., Nevins, J. E. H. & Canfield, R. L. (2017). Maternal choline supplementation during the third trimester of pregnancy improves infant information processing speed: a randomized, double-blind, controlled feeding study. *FASEB J.:* doi:10.1096/fj.201700692RR
2. Mehta S, Finkelstein JL, Venkatramanan S, Huey SL, Udipi SA, Ghugre P, Ruth, C, Canfield, RL, Kurpad, AV, Potdar, RD, Haas, JD. (2017). Effect of iron and zinc-biofortified pearl millet consumption on growth and immune competence in children aged 12–18 months in India: study protocol for a randomised controlled trial. BMJ Open, 7(11).

Academic Honors and Awards:

2012	Environmental Health Perspectives Paper of the Year Award (Engel SM, Wetmur J, Chen J, Zhu C, Barr DB, Canfield RL, Wolff MS. 2011. Prenatal exposure to organophosphates, paraoxonase 1, and cognitive development in childhood. Environ Health Perspect 119:1182-1188.)
2010	NIEHS Paper of the Month Award (Engel, Miodovnik, Canfield, et al.)
2010	Keynote Address: NATO Science for Peace Advanced Scientific Workshop on Heavy Metal exposure in the Balkans
2007	Cornell Presidential Scholar Award (1 of 2)
2007	Cornell Presidential Scholar Award (2 of 2)
2004	Paper (Canfield, et al., 2003) selected as a "Breakthrough Development in Neurology" by the Yearbook of Neurology and Neurosurgery.
1998	Human Development Outstanding Advisor
1994	Kappa Omicron-Nu Distinguished Teaching Award, Finalist
1992	Cornell Presidential Scholar Award

Peer-Reviewed Publications:

Caudill, M. A., Strupp, B. J., Muscalu, L., Nevins, J. E. H. & Canfield, R. L. (2017). Maternal choline supplementation during the third trimester of pregnancy improves infant information processing speed: a randomized, double-blind, controlled feeding study. *FASEB J.:* doi:10.1096/fj.201700692RR

Mehta S, Finkelstein JL, Venkatramanan S, Huey SL, Udipi SA, Ghugre P, Ruth, C, Canfield, RL, Kurpad, AV, Potdar, RD, Haas, JD. (2017). Effect of iron and zinc-biofortified pearl millet consumption on growth and immune competence in children aged 12–18 months in India: study protocol for a randomised controlled trial. BMJ Open, 7(11).

Caserta, M.T., Hall, C.B., Canfield, R.L., Davidson, P., Lofthus, G., Schnabel, K., Carnahan, J., Shelley, L. and Wang, H., (2014). Early developmental outcomes of children with congenital HHV-6 infection. Pediatrics, *134*(6), pp.1111-1118.

*Engel SM, Wetmur J, Chen J, Zhu C, Barr DB, Canfield RL, Wolff MS. (2011). Prenatal exposure to organophosphates, paraoxonase 1, and cognitive development in childhood. Environmental Health Perspectives, 119,1182-1188.

*Engel SM, Miodovnik A, Canfield RL, Zhu C, Silva MJ, Calafat AM, Wolff MS. (2010). Prenatal Phthalate Exposure is Associated with Childhood Behavior and Executive Functioning. Environmental Health Perspectives, 118, 565-571.

Jusko, T. A., Henderson, C. R., Lanphear, B. P., Cory-Slechta, D. A., Parsons, P. J., & Canfield, R. L. (2008). Blood Lead Concentrations < 10 μg/dL and Child Intelligence at 6 Years of Age. Environmental Health Perspectives, *116*(2), 243–248. *("Highly Cited Paper" (Top 1%) in Essential Science Indicators)*

Davidson, PW, J.J. Strain, Gary J. Myers, Sally W. Thurston, Maxine P. Bonham, Conrad F. Shamlaye, Abbie Stokes-Riner, Julie M.W. Wallace, Paula J. Robson, Emeir M. Duffy, Lesley A. George, Jean Sloane-Reeves, Elsa Cernichiari, Richard L. Canfield, Christopher Cox, Li Shan Huang, Joanne Janciuras and Thomas W. Clarkson (2008). Neurodevelopmental effects of maternal nutritional status and exposure to methylmercury from eating fish during pregnancy. Neurotoxicology, 29, 767-775.

J.J. Strain, Philip W. Davidson, Maxine P. Bonham, Emeir M. Duffy, Abbie Stokes-Riner, Sally W. Thurston, Julie M.W. Wallace, Paula J. Robson, Conrad F. Shamlaye, Lesley A. George, Jean Sloane-Reeves, Elsa Cernichiari, Richard L. Canfield, Christopher Cox, Li Shan Huang, Joanne Janciuras, Gary J. Myers and Thomas W. Clarkson (2008). Associations of maternal long-chain polyunsaturated fatty acids, methyl mercury, and infant development in the Seychelles Child Development Nutrition Study. Neurotoxicology, 29, 776-782.

Kordas K, Canfield RL, Lopez P, Rosado JL, Vargas GG, Cebrian ME, Rico JA, Ronquillo D, & Stoltzfus RJ (2006). Deficits in cognitive function and achievement in Mexican first-graders with low blood lead concentrations. Environmental Research, 100, 371-386.

Canfield RL, Jusko T, & Kordas K (2005). Environmental lead exposure and children's cognitive function. Italian Journal of Pediatrics, 31, 293-300.

Dietrich KN, Eskenazi B, Schantz S, Yolton K, Rauh VA, Johnson CB, Alkon A, Canfield RL, Pessah IN, & Berman RF (2005). Principles and Practices of Neurodevelopmental Assessment in Children: Lessons Learned from the Centers for Children's Environmental Health and Disease Prevention Research. Environmental Health Perspectives, 113(10), 1437–1446.

Lanphear, B., Hornung, R., Khoury, J., Yolton, K., Baghurst, P., Bellinger, D.C., Canfield, R.L., Dietrich, K.N., Bornschein, R., Greene, T., Rothenberg, S.J., Needleman, H.L., Schnaas, L., Wasserman, G., Graziano, J., and Roberts, R. (2005). Low-level Environmental Lead Exposure and Children's Intellectual Function: An International Pooled Analysis. Environmental Health Perspectives, 113(7), 894–899.

Canfield, R.L., Gendle, M.H., & Cory-Slechta, D.A. (2004). Impaired neuropsychological functioning in lead-exposed children. Developmental Neuropsychology. 26(1), 513-540.

Canfield, R.L., Jusko, T.A., & Radegonde, V. (2004). Airborne particulate lead and children's mental functioning. Seychelles Medical and Dental Journal, 7(1), 66-71.

*Canfield, R.L., Henderson, C.R., Cory-Slechta, D.A., Cox, C., Jusko, T.A., & Lanphear, B.P., (2003). Intellectual impairment in children with blood lead levels below 10 μg/dL. The New England Journal of Medicine, 35(2), 63-78.

Canfield, R. L., Kreher, D.A., Cornwell, C. & Henderson, C. R. (2003). Low-level lead exposure and executive functions in young children, Child Neuropsychology. 9(1) 35-53.

Canfield, R.L. & Kirkham, N.Z. (2001). Infant cortical development and the prospective control of saccadic eye movements, Infancy, 2(2) 197-211.

Canfield, R.L., Smith, E.G., Brezsnyak, M.P., & Snow, K.L. (1997). Infant information processing through the first year of life: A longitudinal study using the visual expectation paradigm. Monographs of the Society for Research in Child Development, Serial No. 250, Vol. 62, No. 2, whole issue.

Canfield, R. L. & Smith, E.G. (1996). Number-based expectations and counting in early infancy. Developmental Psychology, 32, 269-279.

Canfield, R.L., Wilken, J.A., Schmerl, L., & Smith, E.G. (1995). Age-related change and stability of individual differences in infant saccade RT. Infant Behavior and Development, 18, 351-358.

Haith, M. M., Wentworth, N., & Canfield, R. L. (1993). The formation of expectations in early infancy. In Carolyn Rovee-Collier (Ed.), Advances in Infant Behavior and Development. Norwood, NJ: Ablex.

Canfield, R. L. & Haith, M. M. (1991). Young infants' visual expectations for symmetric and asymmetric stimulus sequences. Developmental Psychology, 27, 198-208.

*Denotes papers receiving awards

Book Chapters:

Canfield, R. L., & Jusko, T. A. (2008). Lead poisoning. In M. M. Haith & J. B. Benson (Eds.), Encyclopedia of infant and early childhood development. Vol. 2, p. 200-213: New York: Elsevier Inc.

Published Abstracts:

Canfield, R.L. (1999). Developmental lead exposure and prefrontal function in children. Abstracts of the XVII International Neurotoxicology Conference, p. 14, Little Rock, AR.

Published Letters:

Lanphear, B., Hornung, R., Khoury, J., Dietrich, K., Cory-Slechta, D., Canfield, R. (2007). The Conundrum of Unmeasured Confounding: Comment on "Can some of the detrimental neurodevelopmental effects attributed to lead be due to pesticides" by Brian Gulson, Science of the Total Environment, (in press).

Jusko T.A., Lockhart, D.W., Sampson, P.D., Henderson, C.R., Jr., & Canfield, R.L. (2006). Response to: ‘‘What is the meaning of non-linear dose–response relationships between blood lead concentrations and IQ?’’, NeuroToxicology, 91, 1151-1153.

Jusko TA, Canfield R.L., Henderson C.R., & Lanphear B.P. (2005). Comments on "Recent developments in low-level lead exposure and intellectual impairment in children". Environmental Health Perspectives, 113(1), 987-994.

Canfield R. L., Henderson C. R. Jr., Lanphear B. P. (2003). Intellectual Impairment and Blood Lead Levels. New England Journal of Medicine, 349 (3), 500-502.

Invited Talks:

2008 *Neurobehavioral Correlates of Chronic Low-level Lead Exposure*. Partnering to Protect Iowa Families. Cedar Rapids Department of Public Health, Cedar Rapids, IA.

2007 *Early Lead Exposure and Enduring Cognitive Deficits*. Invited talk at the National Mid-Year conference on Healthy Homes. Philadelphia, PA.

2006 *Neurobehavioral Correlates of Low-level Lead Exposure in Children*. Invited talk at the Thirteenth Annual New York State Lead Poisoning Prevention Conference. SUNY Purchase, Purchase, NY.

2005 *Blood Lead Concentrations and Children's IQ.* Invited presentation at The Rank Prize Funds conference: Environmental and Nutritional Influences on Infant Development and Behavior. Grasmere, Cubria, England, UK.

2005 *Low-Level Pediatric Lead Exposure and Intelligence in Children*. Invited talk at the Mount Sinai School of Medicine Department of Environmental Medicine. New York, NY.

2004 *Blood lead levels below 10 μg/dL and children's cognitive functioning.* Presented to the New York State Department of Health (NYS-DOH) childhood lead poisoning advisory panel roundtable discussion. Albany, NY.

2004 *Neuropsychological Effects of Low-Level Lead Exposure in Children*. Invited talk at the Harvard School of Public Health. Boston, MA.

2003 *Nonlinearity in the IQ-Blood Lead Relation: Redefining Low-Level Exposure.* Invited talk at the 2nd Annual Conference on Non-Linear Dose-Response Relationships in Biology, Toxicology, and Medicine, University of Massachusetts, Amherst. Amherst, MA.

2003 *Assessing Cognitive Development in Infants and Young Children*. Invited address at the Seychelles Child Development Conference, National Institute of Education, Victoria, Mahe, Seychelles

2003 *Lead-Associated Neurobehavioral Impairments in Young Children.* Invited address to the United States Environmental Protection Agency Region 5 Office of Strategic Environmental Analysis. Chicago, IL.

2002 *Low-Level Lead Exposure and Executive Functions in Young Children.* Invited talk at the 25th Annual Meetings of the International Neuropsychological Society, Toronto.

2002 *Low-Level Lead Exposure and Children's Attention, Learning, and Executive Functions.* Invited talk at the 21st Annual Meetings of the Behavioral Toxicology Society, Research Triangle Park, NC.

2002 *Infant Cognitive Assessment for Studies of Nutrition and Development.* Invited talk at the meetings of the Cognition and Nutrition Working Group, School of Biomedical Sciences, University of Ulster, Coleraine Campus, Northern Ireland.

2002 *Infant Information Processing: Assessing the Developmental Status of Infants With Congential HHV-6 Infections.* Invited talk at Golisano Children's Hospital at Strong Department of Pediatrics, University of Rochester. Rochester, NY.

2001 *Nonlinear Effects of Blood Lead on Children's IQ: Evidence for substantial damage below the CDC "Level of Concern."* Invited talk at the Strong Center for Developmental Disabilities, University of Rochester, Rochester, NY.

2000 *What is Cognition and how is it Assessed?* Invited talk at the 29th Annual Current Issues in Nutrition Conference (5-hour satellite conference live from Iowa State University). Topic: Nutrition and Cognition - Implications for Feeding Infants and Children, Iowa State University, Ames, IA.

2000 *Did We Miss the Boat? Cognitive Deficits in Children with Blood Lead Levels < 10 ug/dL*. Invited talk at the 18th annual meeting of the International Neurotoxicology Conference, Colorado Springs, CO.

1999 *Low Level Lead Exposure and Prefrontal Cognitive Functioning in Young Children*. Invited talk at the 17th annual meeting of the International Neurotoxicology Conference, Little Rock, AR.

1998 *Neurobehavioral Effects of Pediatric Lead Exposure.* Department of Psychology. College of William and Mary.

1998 *Screening for Early Cognitive Damage: Effects of Lead, Nicotine and CO.* Department of Obstetrics & Gynecology, University of Rochester.

1996 *Cognitive Effects of Low Level Lead Exposure in Children: Existence and Explanation.* Family Life Development Center, Cornell University.

1992 *Physics Envy and Undergraduate Research Training in Psychological Science.* Invited discussant for "Undergraduates as Scientists: Successes in a Research-Based Curriculum." Presented at the 101st Annual Convention of the American Psychological Association. Toronto, Ontario, Canada.

1991 *The Visual Expectation Paradigm as a Potential Screening Device for Early Head Injury.* Department of Pediatrics, Hospital for Sick Children, Toronto, CA.

1990 *Visual Foraging in Early Infancy.* Department of Psychology, New York University.

1990 *Visual Expectations in Early Infancy.* Department of Psychology, Harvard University.

Conference Presentations:

Jusko T, Henderson C, Lanphear B, Cox C, Cory-Slechta D, Canfield R. Blood lead concentrations <10 micrograms per deciliter and child IQ at age 6 years. Presented at the 19th Annual International Society for Environmental Epidemiology Conference, September 2007, Mexico City, Mexico. (Epidemiol 2007; 18:s94)

Jusko TA, Conser JM, Canfield RL. Invoking the critical period to explain pediatric lead toxicity: Problems and possibilities. Presented at the 21st International Neurotoxicology Conference, February 2004, Honolulu, HI. (Neurotoxicol. 2004;25:697-98)

Conser JM, Jusko TA, Canfield RL. Constructing exposure indices from blood lead measures: Implications for research design. Presented at the 21st International Neurotoxicology Conference, February 2004, Honolulu, HI. (Neurotoxicol 2004;25:698)

Canfield, R.L. (2003, November). *Assessing Cognitive Development in Infants and Young Children*. Presented at the Seychelles Child Development Conference, National Institute of Education, Victoria, Mahe, Seychelles

Canfield, R.L. (2003, May). *Nonlinearity in the IQ-Blood Lead Relation: Redefining Low-Level Exposure.* Presented at the 2nd Annual Conference on Non-Linear Dose-Response Relationships in Biology, Toxicology, and Medicine, University of Massachusetts, Amherst. Amherst, MA.

Canfield, R.L., Jusko, T.A., & Conser, J.M. (2002, April). *Low-Level Lead Exposure and Children's Attention, Learning, and Executive Functions.* Presented at the 21st Annual Meetings of the Behavioral Toxicology Society, Research Triangle Park, NC.

Jusko, T.A., Canfield, R.L., & Conser, J.M. (2002, April). *Lifetime Environmental Lead Exposure and IQ in 6-Year-Old Children.* Presented at the 21st Annual Meetings of the Behavioral Toxicology Society, Research Triangle Park, NC.

Conser, J.M., Canfield, R.L., & Jusko, T.A. (2002, April). *Low-Level Lead Exposure and Behavior Problems in Young Children.* Presented at the 21st Annual Meetings of the Behavioral Toxicology Society, Research Triangle Park, NC.

Canfield, R.L. (2002, February). *Low-Level Lead Exposure and Executive Functions in Young Children.* Presented at the 25th Annual Meetings of the International Neuropsychological Society, Toronto, CN.

Canfield, R.L. & Jusko, T.A. (2001, August). *Low-Level Lead Exposure and IQ Deficits in Children.* Presented at the 109th Annual Meetings of the American Psychological Association, San Francisco, CA.

Lanphear, B.P., Canfield, R.L., Henderson, C.R. Jr., Cory-Slechta, D.A., & Cox, C. (2001, April). *Environmental exposure to lead and children's intelligence at blood lead concentrations below 10 micrograms per deciliter.* Presented at the Pediatric Academic Societies Annual Meeting, Baltimore, MD.

Canfield, R.L. (2000, October). *Did we miss the boat? Cognitive Deficits in Children with Blood Lead Levels < 10 ug/dL.* Presented at the 18th annual meeting of the International Neurotoxicology Conference, Colorado Springs, CO.

Canfield, R.L., Cornwell, C., & Santoro, D. (2000, July). *Neuropsychological Development in Lead-Exposed Toddlers.* Poster presented at the International Conference on Infant Studies, Brighton, UK.

Canfield, R.L. (1999, October). *Developmental Lead exposure and Prefrontal Function in Children.* Presented at the 17th International Neurotoxicology Conference, Little Rock, AR.

Canfield, R.L., Smith, E.G., Calderone, J., Jones, D.E., Kashan, M., & Lynch, S.R. (1999, June). *Obligatory Attention in Infants: What, When, Where?* American Psychological Society, Denver, CO.

Canfield, R.L., Burnette, M.L., Wencil, E.B., Edwards-Hawver, C.M., Ebbert, R., & Soma, S.K. (1999, April). *Cognitive Effects of Pediatric Lead Exposure: General or Specific?* Society for Research in Child Development, Albuquerque, NM.

Canfield, R.L. & Smith, E.G. (1999, April). *Making Connections: Visual Expectations and the Functional Development of Cortical Visual Pathways.* Society for Research in Child Development, Albuquerque, NM.

Smith, E.G., & Canfield, R.L. (1998, March). *Visual Anticipation in 8-Week-Old Infants: Evidence for Frontal Cortex Function.* Poster presented at the International Conference on Infant Studies, Atlanta, GA.

Raitano, N.A., Canfield, R.L. Smith, E.G., & Burnette, M.L. (1998, March). *Stability and Prediction of Childhood RT and IQ from Infant RT and Anticipation.* Poster presented at the International Conference on Infant Studies, Atlanta, GA.

Noland, J.S., Canfield, R.L. & Henderson, C.R. Jr. (1997, April). *Spatial and Object Reversal Performance of Lead Exposed Toddlers.* Poster presented at the biennial meetings of the Society for Research in Child Development.

Canfield, R.L., Snow, K.L., Brezsnyak, M.P., & Smith, E.G. (1996, April). *Developmental Invariance of Minimum Reaction Time in the Visual Expectation Paradigm.* Poster presented at the International Conference on Infant Studies, Providence, RI.

Canfield, R.L., Brezsnyak, M.P., Aaron, K., & Raitano, N. (1996, April). *Individual Growth Curves for Infant Saccade Reaction Time: Exponential Decline from 2-12 Months.*

Smith, E.G., & Canfield, R.L. (1996, April). *Predictive Saccades in 2-Month-Old Infants: Implications for Current Neurophysiological Models of Visual Development*. Poster presented at the International Conference on Infant Studies, Providence, RI.

Marchalonis, K.M. Sikka, N.A. & Canfield, R.L. (1994, June). *Neuropsychological Effects of Low-Level Pb Exposure During the Second Year of Life*. Poster presented at the International Conference on Infant Studies, Paris, France.

Canfield, R.L., & Smith, E.G. (1993, March). *Counting in Early Infancy: Number-Based Expectations*. Poster presented at the Biennial Meetings of the Society for Research in Child Development.

Canfield, R. L., & Wilken, J. (1991, May). *Anticipation and the Inhibition of Prepotent Responses.* Roundtable discussion at the Annual Meetings of the Jean Piaget Society, Philadelphia, PA.

Canfield, R. L. (1991, April). *Stability of RT and Visual Expectancies from 4 to 6 Months of Age.* Poster presented at the Biennial Meeting of the Society for Research in Child Development, Seattle, WA.

Canfield, R. L., Wilken, J., & Schmerl, L. (1991, April). *Speed of Reaction, Expectancies, and Mental Processing in Young Children.* Poster presented at the Biennial Meeting of the Society for Research in Child Development, Seattle, WA.

Roberts, R. J. Jr., Aman, C. J., & Canfield, R. L. (1989, April). *Developmental Differences in Learning a New Skill: The role of self-imposed constraints*. Paper presented at the Meetings of the Society for Research in Child Development, Kansas City, MO.

Canfield, R. L. (1988, April). *Counting Skills in Early Infancy*? Poster presented at the International Conference on Infant Studies, Washington, D.C.

Canfield, R. L. (1987, April). *Age Differences in Infants' Visual Anticipation of Complex Spatiotemporal Patterns.* Poster presentation at the Meetings of the Society for Research in Child Development, Baltimore, MD.

Canfield, R. L. & Haith, M. M. (1986, April). *Infants' Visual Anticipation of Complex Spatiotemporal Patterns*. Poster presented at the International Conference on Infant Studies, Los Angeles, CA.