

## AT A GLANCE

Founded: 2003

Most recent renewal: 2012

Program Directors: W. Thomas Boyce, University of California, San Francisco, and Marla Sokolowski, University of Toronto

Fellows and advisors: 22

Institutions represented: 16, in 4 countries

Fields and subfields represented: behavioural, developmental, molecular and evolutionary biology; behaviour genetics; epigenetics; cognitive and developmental neuroscience; biological, cognitive and developmental psychology; psychiatry; biological anthropology; epidemiology; public and environmental health; social biomedical science

Interaction meetings: 3; in Montreal, Vancouver and Calgary, Canada

Relevant knowledge user groups: mental health practitioners; early childhood educators; judges and practitioners specializing in juvenile justice

Supporters: The Alva Foundation, George Weston Limited, Great-West Life, London Life and Canada Life, The Joan and Clifford Hatch Foundation, The W. Garfield Weston Foundation, 1 anonymous donor

# CHILD & BRAIN DEVELOPMENT

**Explores the core question of how social experiences and settings affect developmental biology and help set early trajectories of lifelong development and health.**

2015/2016 proved a strong and eventful year for the program in Child & Brain Development. Fellows came together in three program meetings and held an outreach activity associated with CIFAR's Change Makers series. Two new fellows were appointed who expand the range of research expertise in the group, bringing new ideas and perspectives from different subfields in neuroscience. Two new shared postdoctoral fellows were appointed, each of whom will join two program fellows in driving new collaborative research projects. The program will host a prestigious Marbach Conference in April 2018, based on their successful proposal submitted this year. These conferences, held annually by the

Jacobs Foundation, support multidisciplinary specialist discussions on issues in child and youth development and on the transfer of research findings into practice.

This year, a strong focus of the program has been on identifying new research directions and opportunities where the group is best positioned to have impact. This effort has included incorporating new topics and themes into program meetings, such as the human 'connectome' — a term referring to brain areas, their anatomical connections and their functional interactions — and large-scale approaches to mining rich biological data. The program also explored potential new inter- and intra-program collaborations, identified additional areas of expertise that could benefit the program and examined future ways to disseminate the knowledge created from the program.

## Research

- Work by fellows **Joel Levine** (University of Toronto), **W. Thomas Boyce** and CIFAR Advisor **Nancy Adler** (both University of California, San Francisco) and others found that relationships among children may not be as hierarchical as often assumed. Applying a new social network analysis approach derived from Levine's studies of social behaviour in flies, they observed some hierarchy in kindergarten classrooms, but also many interactions that did not follow rank. The finding adds complexity to our understanding of relationships and could help distinguish normal versus concerning behaviour in children at an early age.
  - > Golemiac M, Schneider J, **Boyce WT**, Bush NR, **Adler N**, **Levine JD**. 2016. Layered social network analysis reveals complex relationships in kindergarteners. *Front Psychol.* 7: 276.
- A collaboration between fellows **Megan Gunnar** (University of Minnesota) and **Michael Kobor** (University of British Columbia) showed that early adverse life conditions have effects that are still observable years after marked improvements in children's living conditions. The study combined Gunnar's research on a US-based cohort of adopted children exposed to substantial early-life adversity in Eastern Europe with Kobor's advanced technology to measure epigenetic marks. Their analysis found that the adopted children's immune cells showed patterns of gene methylation different from those of children born into well-resourced homes, suggesting an increased risk for poor health outcomes.
  - > Esposito EA, Jones J, Doom JR, Maclsaac JL, **Gunnar MR**, **Kobor MS**. 2016. Differential DNA methylation of peripheral blood mononuclear cells in adolescents adopted as young children from orphanages in Russia and Eastern Europe. *Dev Psychopathol.* 5: 1-15.
- Discussions on epigenetics and development at CIFAR program meetings led Senior Fellow **Bryan Kolb** (University of Lethbridge) and collaborators to design rat experiments studying how preconception stress on future fathers affects the subsequent neuro-development and behaviour of their eventual offspring. The study resulted in direct evidence that preconception paternal stress modifies brain architecture in developing offspring, which may contribute to later neurodevelopmental disorders.
  - > Harker A, Raza S, Williamson K, **Kolb B**, Gibb R. 2015. Preconception paternal stress in rats alters dendritic morphology and connectivity in the brain of developing male and female offspring. *Neuroscience.* 303: 200-210.

## Other notable publication

- Bruderer AG, Danielson DK, Kandhadai P, **Werker JF**. 2015. Sensorimotor influences on speech perception in infancy. *P Natl Acad Sci USA.* 112(44): 13531-13536.

## IdeasExchange

- Program fellows engage across a wide variety of stakeholder groups, including physicians, parents, educators, policy-makers and many more. In 2015/2016, fellows took part in a CIFAR Change Makers symposium, where researchers and leading practitioners shared insights on early childhood adversity and its impacts on academic achievement, health and well-being, and how to create research-informed interventions to better reach at-risk children in school environments. The event was held in partnership with the Alberta Centre for Child, Family & Community Research.

## Global Academy

- This year, the program appointed two postdoctoral fellows, each co-supervised by a pair of program fellows, to help facilitate high-risk collaborative research projects. These two-year appointments are co-funded by CIFAR and the Alva Foundation. The post-docs will attend and present research at the program meetings.

To learn more: <https://www.cifar.ca/research/child-brain-development/>

Fellow Sara Mostafavi at the October 2015 meeting of CIFAR's program in Child & Brain Development.

