

## TOP 10 TOPICS:

- LANGUAGE
- MEMORY
- SOCIAL SKILLS
- HEALTH
- GENETICS
- AND MUCH MORE...

# 10 X 10 100 REASONS TO CELEBRATE ECD RESEARCH IN CANADA

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Once again, for the tenth consecutive year, we present our annual Top Ten compilation of early childhood development research in Canada. As always, the selection is eclectic and reflects the breadth and wide-ranging nature of ECD research. The complex, transactional and bio-social nature of early development is the common thread running through this compilation of reviews, meta-analyses and original articles.

A solid group of reviews and empirical articles deals with various aspects of **early social-emotional and cognitive development**. For instance, one review paper proposes an integrative framework for describing how cognitive and social factors interact in the early development of social skills, placing special emphasis on the role of executive function and mother-child joint attention in the pro-

cess. Another review looks at the multidimensional character of language development in the first year of life and documents how this process starts *in utero*. Another study challenges the view that older children have better memory than younger children, and thus that memory grows with age.

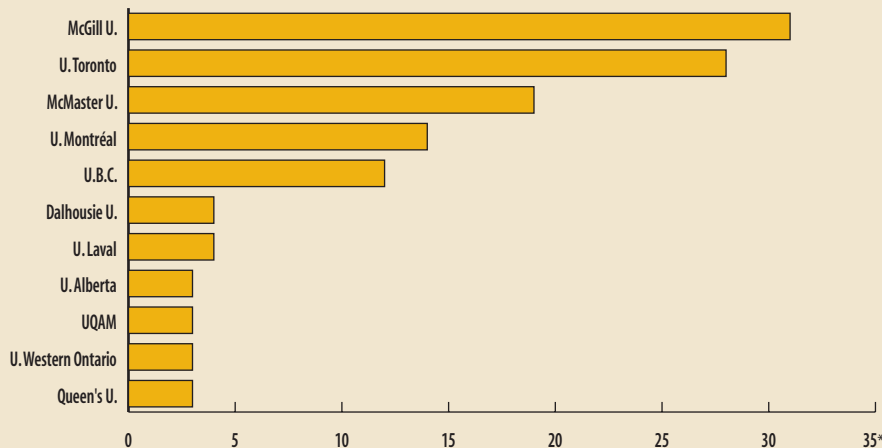
**Gene-environment research** is usually well represented in our Top Ten, and this year

is no exception. A review paper discusses the epigenetic mechanisms underlying the possible biological embedding, through parenting and home environment, of poverty effects on early child development. An empirical paper reveals a complex pattern of genes by environment interactions predicting mood disorder and suicide attempts: several genes that regulate the neurotransmitter serotonin seem to be involved, but each presents a unique pattern of association with mental health outcomes.

As usual, **clinical and epidemiological research**, often with an international scope, is strongly represented in our Top Ten. One study presents results showing that children with bipolar parents are more likely to develop psychiatric disorders, including ADHD. Infant nutrition and breastfeeding is another hot topic. One randomized clinical trial shows how a simple hydrolyzed formula may prevent at-risk children from developing autoantibodies associated with diabetes. Another international study looks at mother-to-child transmission of HIV through breastfeeding, finding that even mothers who were HIV-negative (but who later seroconverted) carry a significant risk of transmitting HIV to their infant. The power of meta-analyses is shown in a review paper concluding that overweight and obese women who become pregnant have an increased risk for premature delivery. One international report presents national and regional statistics on young child deaths and stresses the importance of these statistics for planning ECD policies and programs. These findings all point to the importance and challenges of the early identification and prevention of health problems.

Over the past decade, our annual Top Ten compilation of ECD research in Canada has highlighted a total of 100 scientific papers. The graph to the left illustrates where world-class ECD research is produced in Canada. The 11 institutions listed account for 85% of the Top Ten publications, showing that top ECD research is present in all regions of Canada.

## TOP 100 PAPERS (2001-2010)



\* Number of papers with at least one author from a Canadian institution.

Only shown in this graph, those with at least three publications in the top 100 (2001-2010).

**TABLE 1 – MOST CITED PAPER EACH YEAR FROM 2001 TO 2010**

Year	Authors	Journal	Number of Citations*	
			Average	Total
2001	Liu <i>et al.</i>	<i>Nature Neuroscience</i>	36	394
2002	Castellanos <i>et al.</i>	<i>JAMA</i>	48	475
2003	Sears <i>et al.</i>	<i>New England Journal of Medicine</i>	41	371
2004	Weaver <i>et al.</i>	<i>Nature Neuroscience</i>	128	1023
2005	Gluckman <i>et al.</i>	<i>Lancet</i>	72	507
2006	Shaw <i>et al.</i>	<i>Nature</i>	44	265
2007	Alwan <i>et al.</i>	<i>New England Journal of Medicine</i>	23	114
2008	Hutchison <i>et al.</i>	<i>New England Journal of Medicine</i>	25	101
2009	McGowan <i>et al.</i>	<i>Nature Neuroscience</i>	77	231
2010	Black <i>et al.</i>	<i>Lancet</i>	53	105

\*Timespan: From publication date to July 3, 2011

A sample of 100 papers published in the top journals over the past decade clearly gives us a good idea of where world-class excellence in ECD research stands in Canada. It also provides a strong corpus of selected research for a more fine-grained analysis of our choices over the years, and thus provides a unique standpoint for analyzing trends in ECD research in Canada.

**MOST CITED TOP TEN ARTICLES 2001-2010**

The tenth anniversary of our yearly *Bulletin* is an excellent opportunity to take a closer look at the actual scientific impact of these publications. Using Institute of Scientific Information (ISI) statistics, we selected each year's most cited Top Ten paper from 2001 to 2010 (see Table 1). The mean annual number of citations ranges from 23 to 128, indicating that our Top Ten papers have had quite a significant impact in their fields of knowledge.

**EPIGENETICS AND ECD**

New findings on epigenetic processes have clearly attracted the attention of the scientific community in recent years. The two most cited papers, both published in *Nature Neuroscience*, are from the same research team at McGill University and deal with epigenetic mechanisms of the stress response. By far, the most cited paper is the 2004 article on epigenetic programming by maternal behaviour<sup>1</sup> (128 citations/year), followed by a more recent paper, published in 2009, on the role of child

abuse in the epigenetic regulation of the stress system<sup>2</sup> (77 citations/year). A third paper from the same journal, published in 2000, linked maternal care, hippocampal synaptogenesis and cognitive development<sup>3</sup> (36 citations/year). By and large, these three papers speak to the crucial role and biological embedding of early social experience in development.

**CLINICAL AND EPIDEMIOLOGICAL RESEARCH**

Our 2001-2010 selection of clinical and epidemiological research was also well referenced. A 2005 paper reporting on selective head cooling to treat neonatal encephalopathy<sup>4</sup> made quite a significant impact on the field (72 citations/year). So did papers on brain volume abnormalities associated with ADHD<sup>5</sup> (2002; 48 citations/year), the long-term follow-

up of childhood asthma<sup>6</sup> (2003; 41 citations/year), the use of selective serotonin-reuptake inhibitors in pregnancy and the risk of birth defects<sup>7</sup> (2007; 23 citations/year), hypothermia therapy after traumatic brain injury in children<sup>8</sup> (2008; 25 citations/year), and an international overview of causes of child mortality in 2008<sup>9</sup> (2010; 53 citations/year).

Basic knowledge on early childhood development is perhaps the poor relation of the lot, with only one paper on intellectual abilities and cortical development<sup>10</sup> (2006; 44 citations/year) making it to the Top Ten.

These statistics on the annual rate of citations for our Top Ten selections are quite impressive and indicate that Canadian researchers are at the forefront of the international effort to build basic and applied ECD knowledge. Clearly, there is much cause for celebration. 🐼

References:

- Weaver ICG, Cervoni N, Champagne FA, D'Alessio AC, Sharma S, Seckl JR, Dymov S, Szyf M, Meaney MJ. Epigenetic programming by maternal behavior. *Nature Neuroscience* 2004;7(8):847-854.
- McGowan PO, Sasaki A, D'Alessio AC, Dymov S, Labonté B, Szyf M, Turecki G, Meaney MJ. Epigenetic regulation of the glucocorticoid receptor in human brain associates with childhood abuse. *Nature Neuroscience* 2009;12(3):342-348.
- Liu D, Diorio J, Day JC, Francis DD, Meaney MJ. Maternal care, hippocampal synaptogenesis and cognitive development in rats. *Nature Neuroscience* 2000;3(8):799-806.
- Gluckman PD, Wyatt JS, Azzopardi D, Ballard R, Edwards AD, Ferriero DM, Polin RA, Robertson CM, Thoresen M, Whitelaw A, Gunn AJ. Selective head cooling with mild systemic hypothermia after neonatal encephalopathy: Multicentre randomised trial. *Lancet* 2005;365(9460):663-670.
- Castellanos FX, Lee PP, Sharp W, Jeffries NO, Greenstein DK, Clasen LS, Blumenthal JD, James RS, Ebens CL, Walter JM, Zijdenbos A, Evans AC, Giedd JN, Rapoport JL. Developmental trajectories of brain volume abnormalities in children and adolescents with attention-deficit/hyperactivity disorder. *JAMA-Journal of the American Medical Association* 2002;288(14):1740-1748.
- Sears MR, Greene JM, Willan AR, Wiecsek EM, Taylor DR, Flannery EM, Cowan JO, Herbison GP, Silva PA, Poulton RA. Longitudinal, population based, cohort study of childhood asthma followed to adulthood. *New England Journal of Medicine* 2003;349(15):1414-1422.
- Alwan S, Reefhuis J, Rasmussen SA, Olney RS, Friedman JM. Use of selective serotonin-reuptake inhibitors in pregnancy and the risk of birth defects. *New England Journal of Medicine* 2007;356(26):2684-2692.
- Hutchison JS, Ward RE, Lacroix J, Hebert PC, Barnes MA, Bohn DJ, Dirks PB, Doucette S, Fergusson D, Gottesman R, Joffe AR, Kirpalani HM, Meyer PG, Morris KP, Moher D, Singh RN, Skippen PW. Hypothermia therapy after traumatic brain injury in children. *New England Journal of Medicine* 2008;358(23):2447-2456.
- Black RE, Cousens S, Johnson HL, Lawn JE, Rudan I, Bassani DG, Jha P, Campbell H, Walker CF, Cibulskis R, Eisele T, Liu L, Mathers C. Global, regional, and national causes of child mortality in 2008: A systematic analysis. *Lancet* 2010;375(9730):1969-1987.
- Shaw P, Greenstein D, Lerch J, Clasen L, Lenroot R, Gogtay N, Evans A, Rapoport J, Giedd J. Intellectual ability and cortical development in children and adolescents. *Nature* 2006;440(7084):676-679.