



CAN YOUNG CANADIAN ECD INVESTIGATORS BE FIRST CLASS?

BY RICHARD E. TREMBLAY, CEECD DIRECTOR

When Health Canada decided to create Canadian Centers of Excellence for Children's Well-Being we took the word "excellence" to mean "of the highest quality". Over the past six years we have been monitoring the "top rate" publications on ECD by Canadians and have published annually a Top 10 list. We defined "top rate" as publishing in the "highest quality" international scientific journals.

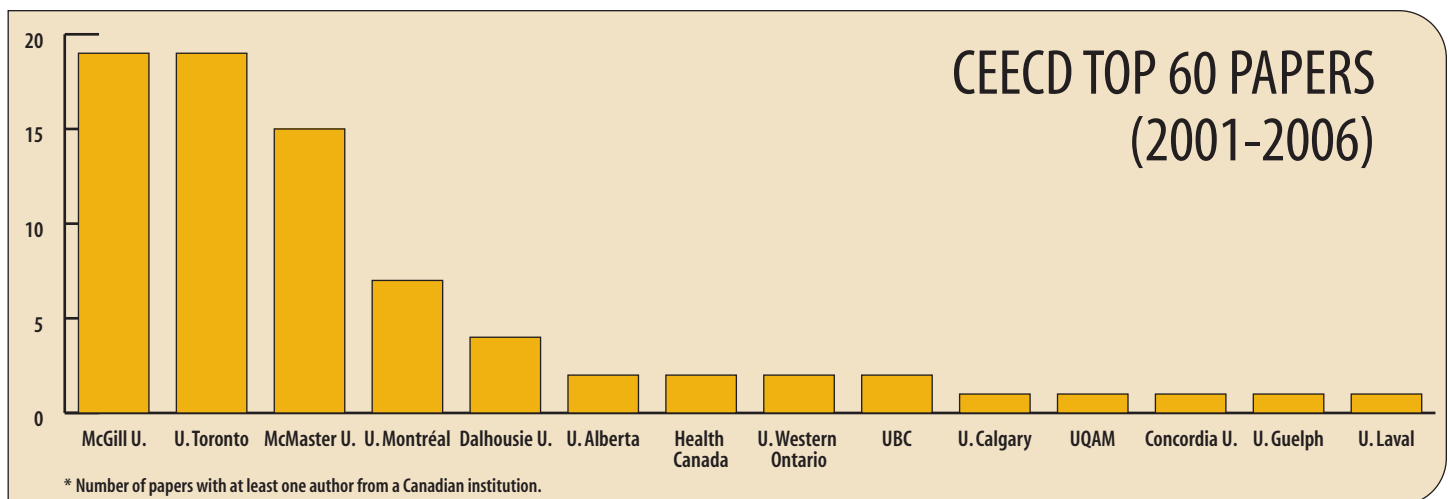
There is always a problem with selecting "the best". It means that few will be selected. We were recently told that this "elitist" approach meant that we were celebrating the "old" rather than the promising "young". My first reaction was to create a Top 10 for the young Canadian investigators. But before jumping into this new enterprise I wondered to what extent the young were effectively excluded from our Top 10 annual celebrations. I remembered that in 2003 we had celebrated a "young" McMaster student (Richard Le Grand) and his "old" supervisor (Daphne Maurer) specifically to highlight the fact that the best research in Canada is done by teams that bring together the experience of the older researchers and the skilled determination of the young.

I am extremely happy to report that the "young" Canadian investigators on early childhood development are very well represented among the authors of the "top rate" publications in the world. Indeed, of the 60 Top 10 publications over the past six years at least 18 of the first authors published their paper less than nine years after their last degree. Furthermore, six of the 60 were still students when the paper was published.

We selected three of these 18 excellent young investigators for our Profile of leading Canadian investigators on page 2. Suzanne Richter was working on her MSc at the University of Toronto when she published her paper on screening for children's eye cancer in the *American Journal of Human Genetics* (see *CEECD Bulletin* Vol.3, No 2-Sept. 2004, p.5).

Ian Weaver was a PhD student at McGill University when he published his paper on epigenetic effects of maternal licking in rats in *Nature Neuroscience* (see *CEECD Bulletin* Vol.4 No 2-Oct. 2005 p.4). Éric Lacourse was an assistant professor at the *Université de Montréal* when he published his paper on early predictors of deviant peer affiliation in *Archives of General Psychiatry* (see page 11 in this *Bulletin*). All three published their papers with a large team of co-investigators at different stages of their career. **World class excellence in ECD research is achieved by interdisciplinary, interuniversity, and intergenerational research teams.** We do not need to lower the standards to celebrate the excellent young investigators.

Our annual Top 10 has now generated a total of 60 scientific papers. Each of these has at least one author from a Canadian institution. The figure below of the page shows the distribution of authors among Canadian research institutions. For example McGill U. and U. of Toronto had at least one author on 19 of the 60 articles, and 15 for McMaster. A sample of 60 over six years gives a very good idea of where world class excellence in ECD research can be found in Canada. 🦋



YOUNG CANADIAN RESEARCHERS MAKING A DIFFERENCE

Each year, young Canadian researchers distinguish themselves by publishing top quality research on ECD in prestigious scientific journals. While their research topics are varied, all are innovative thinkers who were published at a young age. Here are three examples.

REMAINING TRUE



■ **Éric Lacourse** is particularly interested in deviancy, the prevention of social marginalization, and cultural differences in the socialization and lifestyles of young people. After obtaining his PhD in educational psychology from the *Université de*

Montréal, Lacourse did a post-doctoral study at the University's Research Unit on Children's Psychosocial Maladjustment. He then pursued his work on developmental trajectories of antisocial behaviors and the affiliation with deviant peers at the Heinz School of Public Policy and Management in the United States (Carnegie Mellon University, Pittsburgh).

Lacourse returned to Montreal, his home city, to work as a researcher at the *Université de Montréal* in 2002, and accepted a position as associate professor in the sociology department a year later. His most recent findings, "Prediction of Early-Onset Deviant Peer Group Affiliation: a 12-Year Longitudinal Study"¹ (see page 11), show that certain traits and family risk factors leading to delinquency can be identified as early as kindergarten, suggesting new avenues for prevention.

One of the challenges of pursuing a researcher's career, he says, is remaining true to yourself rather than being pulled in by dominant ideological trends. He uses music—another of his passions—as an analogy: "There's mainstream music and underground music; in my research, I'd like to bring the more 'underground' or marginal research themes to the surface for people to see." Lacourse recently received a career grant from the *Fonds de la recherche en santé du Québec* to investigate prevention of externalized behaviors through leisure and sport activities.

MAKING SACRIFICES



■ **Suzanne Richter** is originally from Hamilton, Ontario. It was while working on her MSc in the Department of Laboratory Medicine and Pathobiology at the University of Toronto that she became interested in genetics and oncology,

and began working in the lab of Dr. Brenda Gallie at the Princess Margaret Hospital. Their research centred on retinoblastoma, a childhood eye cancer. In the past, Richter explains, children from families with a history of the disease had to undergo invasive and risky surveillance screening. Working with Gallie's team, Richter helped develop a genetic screen, a test that can identify children at risk early and avoid unnecessary examinations. "It was a true opportunity to make a difference to those kids," she says. Their findings were published in 2003, under the title "Sensitive and efficient detection of Rb1 gene mutations enhances care for families with retinoblastoma."²

Now Richter is excited about taking her research a step further by getting involved in the clinical end. After completing her Master's, she returned to school to get her Doctor of Medicine (M.D.) from the University of Western Ontario. She is currently a resident in internal medicine at the London Health Social Sciences Centre in Ontario. "I've had to make sacrifices to follow my passion," she says, "but it is certainly worth it!" She looks forward to specializing in oncology so that she can pursue both her research and clinical work in the field.

GOING AGAINST THE GRAIN



■ **Ian Weaver**, originally from Winchester, U.K., came to Canada to do his PhD in Neuroscience at McGill University, working in the lab of Dr. Michael Meaney. They were studying behavioural epigenomics, looking at the effects of rats' maternal

behavior toward their offspring. In his research study "Epigenetic programming by maternal behavior,"³ Weaver showed that rats that received a great deal of maternal licking and grooming early in life actually had different levels of DNA methylation, which affects how genes are expressed. For humans, this means that mother-child early intervention programs can have lasting effects on children's development.

Weaver says that because these findings go against the prevailing belief that DNA methylation patterns are static and unchanging, it was difficult to get published. "It's long been said that your genome is what makes you," he says. "But we're showing that the environment also sculpts who you are, by switching those genes on or off." Weaver is now a post-doctoral fellow in the cell biology program at Toronto's Hospital for Sick Children.

All three researchers say they owe a tremendous amount to their supervisors for helping them get to where they are today. They continue to work hard and, as time goes on, they will no doubt foster a new generation of talented investigators. 🦋

• BY EVE KRAKOW

1. Lacourse E, Nagin DS, Vitaro F, Côté S, Arseneault L, and Tremblay RE. Prediction of Early-Onset Deviant Peer Group Affiliation: a 12-Year Longitudinal Study. *Archives of General Psychiatry* 2006;63(5):562-568.

2. Richter S, Vandezande K, Chen N, Zhang K, Sutherland J, Anderson J, Han LP, Panton R, Branco P, Gallie B. Sensitive and efficient detection of Rb1 gene mutations enhances care for families with retinoblastoma. *American Journal of Human Genetics* 2003;72(2):253-269.

3. 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.

DEPRESSION, PREGNANCY AND TREATMENT: WEIGHING THE OPTIONS

It is widely known that depression in pregnant women poses risks to the baby's development, both during pregnancy and after birth. However, treating depression with medication is not without risks for the baby, either.

Dr. Tim Oberlander, from the Centre for Community Child Health Research in Vancouver, explains that in the last decade, there has been concern that newborns of pregnant women who take SSRI antidepressants (selective serotonin reuptake inhibitors) tend to experience a cluster of behaviors that include jitteriness, respiratory distress and feeding difficulties. *"While this situation has been observed for many years, we still don't know if these behaviors are a result of the drug or of the mother's depressed mood."* One reason this question is so difficult to answer is because it is medically and ethically impossible to do a randomized trial comparing medicated depressed, non-medicated depressed, and non-depressed mothers. Therefore, Oberlander and a team of Canadian researchers used population health data to link records of birth outcomes with records of maternal health and prenatal prescriptions for SSRIs. They looked at all live births (about 120,000) in British Columbia over a 39-month period.

EFFECTS OF PRENATAL EXPOSURE

To account for maternal illness severity, researchers identified a group of depressed women who were not using medication but who had the same illness severity characteristics as women who were depressed and on medication. They found that babies of depressed mothers, medicated or not, had lower birth weights, shorter gestational ages, increased respiratory distress, and more jaundice and feeding problems. Babies who had been exposed to SSRIs had shorter gestational ages and increased rates of respiratory distress than babies who had not been exposed to



"While this situation has been observed for many years, we still don't know if these behaviors are a result of the drug or of the mother's depressed mood."

medication. *"This suggests that we are looking at a drug effect, and not an effect of the depression itself,"* says Oberlander.

However, he is quick to add that this does not mean that doctors should avoid prescribing medication to depressed pregnant mothers. *"The effects of untreated maternal depression are potentially worse, when you consider many of the associated problems, such as poor nutrition, partner violence or other drug use. The real question is: what other treatment options are available? By asking this key question, we can move beyond the issue of whether medications are good or bad,"* says Oberlander.

MULTIPLE CAUSES OF DEPRESSION

Dr. Martin St-André, an infant psychiatrist at the *CHU Sainte-Justine* in Montreal, says

these research findings suggest that practitioners should be cautious when prescribing SSRIs to pregnant women. However, he too warns that the long-term effects of untreated maternal depression can be harmful to the child's neurodevelopment and to the mother-child relationship.

He notes that pregnancy and the first postpartum year are developmental crises periods, and that it is important to distinguish between major antenatal depression, adjustment disorders and normal mood variations. *"These findings remind us that before prescribing medication to pregnant mothers, we should thoroughly consider non-pharmacological options,"* says St-André. 🌱

• BY EVE KRAKOW

Ref.: Oberlander TF, Warburton W, Misri S, Aghajanian J, Hertzman C. Neonatal outcomes after prenatal exposure to selective serotonin reuptake inhibitor antidepressants and maternal depression using population-based linked health data. *Archives of General Psychiatry* 2006;63(8):898-906.

INCONVENIENT RISKS FOR CONVENIENT DELIVERIES

As she reaches the end of her pregnancy, there are many reasons why a woman might want or need to undergo a caesarean section or have her labour induced. Some reasons can be quite compelling, such as when mother or foetus develops a condition that can make continuing the pregnancy life-threatening for either of them. Others are less compelling.



There's no question that induction of labour or Caesarean delivery can be life-saving for the mother or foetus when severe complications arise during pregnancy or delivery. Two new studies, however, cast doubt on the wisdom of undergoing either intervention just for the sake of convenience or personal preference. While both procedures are generally safe, they are associated with more risks than a typical, uncomplicated natural delivery. They also generally cost more, leaving fewer healthcare dollars available for pregnant women who really need medical intervention.

CAESAREANS AND INCREASED RISK

The number of Caesarean deliveries is growing around the world, from about 5% in developed countries in the early 1970s to more than 50% in some parts of the world by the late 1990s. In this light, the World Health Organization undertook a 2005 global survey on maternal and perinatal health to look at the impact of Caesareans performed in hospitals in eight Latin American countries.

The median rate of Caesarean delivery was 33%. Of those, 49% were elective procedures in which the Caesarean option was chosen long before the onset of labour, 46% were prescribed during labour, and 5% were for an emergency that had been identified before the onset of labour. Reasons for an emergency Caesarean included a problem with the foetus, vaginal bleeding, uterine rupture, and a serious complication of pregnancy characterised by convulsions, potentially fatal to mother and baby, called eclampsia. Private hospitals had the highest rates of Caesareans,

“Our data have eliminated the main argument that all Caesarean populations are high-risk.”

mainly because they performed an increased number of Caesareans that were not medically necessary. Overall, 30% of women undergoing a Caesarean birth had a history of previous Caesareans.

After the delivery, women with Caesareans were more likely to need antibiotics and stay in hospital for longer than seven days. The risk of the baby dying was higher, as was the number of babies admitted to intensive care for at least seven days. Researchers found that there was a higher risk of early delivery and neonatal deaths when a hospital's Caesarean delivery rates reached 10% to 20%.

Lead investigator Dr. José Villar, of the World Health Organization, says this study illustrates how a medical procedure that is effective for women who need it, can do more harm than good when used on women who do not require it. *"Our data have eliminated the main argument that all Caesarean populations are high-risk,"* he says. *"There is evidence in our work that perhaps there is more harm than good being done among women not at high risk."*

Villar points out that hospitals that over-use Caesareans in low-risk women will also have less money available for cases that require intervention using complex technology and equipment. *"Meanwhile, a mother who is hospitalized for more than a week because of an infection following Caesarean surgery is obviously less available for taking care of the child,"* he says.

INDUCED LABOUR, INCREASED RISK

The issues are similar for women who undergo induction of labour for matters of convenience. Another new study suggests that medically induced labour is associated with an increased risk of a serious, often fatal complication called amniotic fluid embolism.

An amniotic fluid embolism occurs when amniotic fluid, cells from the baby, or other debris enters the mother's bloodstream. This can cause her whole circulatory and respiratory system to collapse, which can be fatal.

"Induced labour seems to about double the risk of this very serious and often fatal complication," says lead author Dr. Michael S. Kramer from McGill University's Faculty of Medicine. *"The absolute risk is low, but women and doctors should be aware of this risk when making decisions."*

Kramer and colleagues from the Maternal Health Study Group of the Canadian Perinatal Surveillance System analyzed data on 3 million hospital deliveries that took place in Canada between 1991 and 2002. They found that amniotic fluid embolisms are a concern: they occur in about 6 in 100,000 deliveries of single babies and about 15 in 100,000 multiple births (twins, triplets, etc.). In pregnancies where labour was medically induced, the risk of amniotic fluid embolism nearly doubled, and the risk of a fatal embolism increased 3.5 times. These rates may seem low, but they are not negligible.

WEIGH BENEFITS AND RISKS OF INTERVENING

"A lot of inductions are done for specific reasons, like the mother's blood pressure is too high or baby's not growing well and the obstetrician is worried about either the mother's or the foetus's health. But then, there are all the inductions that are being done for convenience. These convenient inductions are the ones that might be reconsidered given the increased risk of amniotic fluid embolism," says Kramer.

Dr. William Fraser, director of the Department of Obstetrics/Gynaecology at the *Université de Montréal*, says these two studies highlight how important it is to study thou-

"These convenient inductions are the ones that might be reconsidered given the increased risk of amniotic fluid embolism."

sands of people when trying to determine the risks of obstetric technologies such as induced labour and Caesarean section. This is because serious adverse events associated with these interventions are rare enough that they may not show up at all in a study of only a few hundred patients.

"The rampant elective use of these technologies in certain settings means that very high numbers of women are unnecessarily exposed to these risks," Fraser says. From his point of view, both studies underline the need to put into place mechanisms to audit the elective use of certain obstetrical technologies and to develop strategies to limit the use to situations where they are medically indicated as well as the importance of communicating to patients their associated risks. 🦋

• BY ALISON PALKHIVALA AND HELENA KATZ

Ref.: Villar J, Valladares E, Wojdyla D, Zavaleta N, Carroli G, Velazco A, Shah A, Campodonico L, Bataglia V, Faundes A, Langer A, Narvaez A, Donner A, Romero M, Reynoso S, De Padua KS, Giordano D, Kublickas M, Acosta A. Caesarean delivery rates and pregnancy outcomes: the 2005 WHO global survey on maternal and perinatal health in Latin America. *Lancet* 2006;367(9525):1819-1829.

Ref.: Kramer MS, Rouleau J, Baskett TF, Joseph KS. Amniotic-fluid embolism and medical induction of labour: a retrospective, population-based cohort study. *Lancet* 2006;368(9545):1444-1448.

INDIA'S MISSING GIRLS

Fewer girls than boys are born in India, and the gap has been widening. There were 962 girls per 1,000 boys under the age of seven in 1981. By 2001, that figure had dropped to 927 girls per 1,000 boys.



“The study has re-invigorated debate about selective abortion in India.”

India has a cultural preference for boys. Although prenatal sex determination has been illegal since 1994, the law is often ignored.

In order to understand this drop, researchers used the gender of previous births in a family to assess whether prenatal sex determination and selective abortion affects sex ratios at birth. The study included questions to ever-married women in 1.1 million households about their fertility history and children born in 1997.

The study found that girls were less likely to be born to women who were having a second or third child when the previous children were girls. This appeared more likely to occur in mothers with at least a Grade 10 education, who may have greater access to ultrasound, than illiterate mothers. Stillbirths and neonatal

deaths were more likely to occur with males, suggesting that female infanticide is not the key reason for missing girls.

Researchers estimate that some 10 million female fetuses were aborted from about 1985 to 2005. They believe that prenatal sex determination followed by selective abortion of female fetuses is the most likely explanation for the low sex ratio at birth in India.

“The study has re-invigorated debate about selective abortion in India,” says lead investigator and University of Toronto professor Dr. Prabhat Jha. India’s prime minister has spoken out against female selective abortion, and has also included measures to reduce the practice in a new national \$7-billion public health program. *“Since the paper appeared, more attempts are being made at enforcement,”* Jha says.

He wants to raise awareness of the issue both locally and internationally. *“We are also trying to ensure that missing girls are reliably measured and reported in the 2011 census (in India and elsewhere), and have asked the UN’s Commission on the Status of Women to highlight this,”* he says. Jha hopes that the net result will be better lives for Indian girls, and better prospects for Indian society.

“This research warns professionals and policy-makers of the rising rate of prenatal sex determination and the growing exclusion of girls,” says Francisco Quiazua, Coordinator at the Centre of Excellence for Early Childhood Development at the *Université de Montréal*. Studies have shown that a mother’s level of education has an impact on her children, he explains. *“We need to consider how a decrease in the number of girls can affect population growth and population health. The more we invest in childhood development, and the more we invest in the health and education of young girls, knowing how their level of education will impact their children, the greater the opportunities for humanity’s success,”* Quiazua says. 🐾

• BY HELENA KATZ

Ref.: Jha P, Kumar R, Vasa P, Dhingra N, Thiruchelvam D, Moineddin R. Low male-to-female sex ratio of children born in India: national survey of 1.1 million households. *Lancet* 2006;367(9506):211-218.

TREATING PREEMIES WITH CAFFEINE

REDUCES CHANCE OF LUNG DAMAGE

A large international multi-centre trial recently showed that injecting caffeine into pre-term low-weight babies improves breathing, lessens time on a ventilator and reduces the need for supplemental oxygen, all without short-term negative side effects.

Hospitals have been treating premature infants with caffeine for some 30 years, but the use is unapproved in most countries and only approved for very short-term use in selected cases in the United States. Yet animal studies indicate that injecting high doses of caffeine into baby and mature specimens sometimes causes negative side effects ranging from aggressive behavior and weight loss to brain damage. Barbara Schmidt, a pediatrician and researcher who now splits her time between the Faculty of Health Sciences at McMaster University and the University of Philadelphia, was concerned. She gathered together colleagues from around the world to learn whether the anecdotal benefits of caffeine actually exist and whether treatment could lead to adverse outcomes by the time the babies reached 18 to 21 months.

After considering 5,292 infants weighing 500 to 1,250 grams in their first 10 days of life, doctors from many countries randomly assigned 2,006 infants to the trial. One thousand and six were treated with caffeine, while the rest received a saline solution.

The babies who were treated with caffeine fared so much better than those on the placebo that the external safety-monitoring panel suggested that results up to the first discharge home be analyzed and published. The study, published in the *New England Journal of Medicine*, clearly indicated that caffeine helped regulate the babies' breathing, thereby reducing potential lung damage, without increased short-term risks to the health of the child.

"This trial showed that caffeine was safe to use and was even more effective than we even thought at reducing lung injury," says Schmidt. *"The one mildly worrying aspect was a temporary reduction in weight gain in the caffeine group, but they caught up after the first three weeks of therapy."*

Researchers have since completed the longer 18-month trial. An abstract they presented to the Pediatric Academic Societies' annual meeting in Toronto in May 2007, how-

ever, indicated that caffeine reduced the risk of death or disability (neurodevelopmental damage) at 18 to 21 months. The researchers plan to continue the study until the children enter school at five years of age.

Jill Boulton, a neonatologist and senior medical director at St. Joseph's Health Care, London, Ontario, which did not participate in the study, had seen a reduction in the routine use of caffeine over the past few years due to concerns about its potential effect on the preterm brain. *"The long term positive effects recently presented were very reassuring, such that I think that it will become part of our standard therapy for very low birth weight preterm babies,"* she concludes. 🐾

"This trial showed that caffeine was safe to use and was even more effective than we even thought at reducing lung injury."

• BY TRACEY ARIAL



TINY BABIES CAN MAKE PRODUCTIVE ADULTS

Seeing a tiny infant barely bigger than a pound squirming in his incubator, it can be hard to imagine that the same child might one day be president of a multinational. But don't discount the potential of that little infant, says Saroj Saigal, from the Department of Pediatrics at McMaster University. She and her team have followed extremely low birth-weight infants right through to early adulthood and found that given the proper support and resources, these children can do quite well as adults.

"Health-care professionals and society appear to have very low expectations of people with disabilities achieving any degree of normal functioning and productivity as young adults," says Saigal. "This study is a reflection that children with disabilities can grow up to be productive."

Saigal and her colleagues followed 166 infants born in central-western Ontario at weights of 501 to 1,000 g. (1.1 to 2.2 lbs) between 1977 and 1982. They compared the outcomes of these children with 145 babies born at a normal birth weight.

After following about 90% of the children until they reached the ages of 22 to 25, Saigal's team found no differences between the two groups in terms of the level of education they had attained or their employment status. Both groups of participants were also similar with respect to achieving the important landmarks of living independently, marrying or cohabitating, and becoming parents.

Patricia Riley, a neonatal specialist at the Montreal Children's Hospital, calls this work "ground-breaking" because it is the first of its kind to report educational and employment outcomes in such detail in a large, geographically-defined group of young adults who were born very prematurely.

"This study shows that young adults born at extremely low birth weight, as a group, were not different from their normal birth weight peers with respect to their high-school completion rates and proportion going on to higher education," says Riley. "As expected, more of the extremely low birth-weight group (27%) had impairments (e.g. cerebral palsy, blindness, hearing impairment, severe intellectual handicaps).



In spite of this, most survivors were either at school or at work or both."

"It is clear," Riley says, "that it takes many years to really know how an individual will function in life, and this should be made clear when counseling parents of a very premature newborn. While this study does not minimize the serious problems that some premature infants will face, it gives a great deal of hope that this population can be a functional part of society."

However, Saigal has one caveat. The children she followed grew up in middle-class Canadian families with access to universal health care and social resources. The findings probably do not generalize to people in less favorable circumstances. Saigal says that medical advances mean that far more of the tiny babies born today survive, but the disability rate among these children has re-

"While this study does not minimize the serious problems that some premature infants will face, it gives a great deal of hope that this population can be a functional part of society."

mained constant. There is no reason to think they will be any worse off than the children followed in her study; in fact, they may do even better. 🐾

• BY ALISON PALKHIVALA

Ref.: Saigal S, Stoskopf B, Streiner D, Boyle M, Pinelli J, Paneth N, Goddeeris J. Transition of extremely low-birth weight from adolescence to young adulthood: Comparison with normal birth-weight controls. *JAMA-Journal of the American Medical Association* 2006;295(6):667-675.

BRAIN DEVELOPMENT HUMMING RIGHT ALONG

For young children, learning music may mean a great deal more than just a way to impress. New research shows that taking music lessons can actually stimulate the growth and development of connections within the brain – the same connections also believed to be involved in the abilities to focus and sustain attention as well as memorize information on the fly.

MEASURING BRAIN WAVES IN RESPONSE TO MUSIC

“The brain is very influenced by the given environment. It builds up special networks to accommodate what’s happening in daily life,” says Takako Fujioka from the Rotman Research Institute, Baycrest, at the University of Toronto. *“If you enjoy and keep doing something, then the brain gets a positive effect.”*

Fujioka and colleagues measured the brain waves of 12 children aged four to six while they listened to a violin sound or a burst of noise. They repeated this test several

times over the course of a year. The same year, only half of the children in the study received music lessons. The investigators measured the children’s brain waves using an imaging system called magnetoencephalography, or MEG, which measures the magnetic fields produced by the electrical activity of the brain, indicating which parts of the brain were active while the children listened to the sound.

Over that year, the brain waves of all the children in the study changed shape, reflecting the development of new brain connec-

tions, particularly in the auditory system. Exposure to music lessons influenced where and how these connections took place. The brains of children taking music lessons started responding differently to the violin sound and burst of noise, while the brains of children who did not receive music lessons gave the same response to both sounds throughout the entire study. Fujioka says these findings demonstrate how the parts of the brain responsible for sound processing and attention develop rapidly in young children.

MUSICAL TRAINING AS A BRAIN STIMULANT

According to Margot J. Taylor, a neuroscience and brain-imaging specialist at the Hospital for Sick Children in Toronto, the study shows that musical training appears to facilitate auditory system development and improve auditory processing in young children, as well as having a positive correlation with improved scores on other non-musical measures of ability. *“These findings suggest that musical training can yield improvements in at least some other areas of cognitive processing,”* explains Taylor.

Fujioka hopes that normal school programs will take the importance of music more seriously because of the beneficial ‘side effect’ in cognitive development. *“The opportunity to enjoy music and at the same time learn how to focus on a specific goal should be provided to children widely.”* Although any kind of serious practice of a skill has the potential to offer these benefits, music has in addition the social and emotional power to connect people. He also says that, for children whose brain development is not following a normal course, there is potential that musical training could be used, with further research, to improve the growth of connections in the brain. 🎵

• BY ALISON PALKHIVALA

“If you enjoy and keep doing something, then the brain gets a positive effect.”



Ref.: Fujioka T, Ross B, Kakigi R, Pantev C, Trainor LJ. One year of musical training affects development of auditory cortical-evoked fields in young children. *Brain* 2006;129(10):2593-2608.

GROWING GREY MATTER LINKED TO INTELLIGENCE?

Intelligence may lie not in how much grey matter you have, but rather in how it develops throughout childhood and adolescence. A new study has shown that the more the cerebral cortex changes over time, the more intelligent a child is likely to be.

“What is the relationship between an index of general intelligence and the shape or size of the cerebral cortex in a large cohort of children?” asks co-author Jason Lerch, from the Hospital for Sick Children in Toronto.

In a study designed and led by Philip Shaw, from the National Institutes of Health in the United States, Lerch and colleagues used magnetic resonance imaging (MRI) to create images of the brains of 307 children and adolescents. They then used the images to measure the thickness of each child’s cerebral

cortex. All the children had their brains scanned at least once, 178 received two brain scans, and 92 received three or more brain scans. The average time between scans was two years. The researchers then looked at the relationship between the thickness of the cerebral cortex and the children’s intelligence, as measured by standard IQ tests.

BIGGER ISN’T NECESSARILY BETTER

It turns out that the relationship between the size and shape of the cerebral cortex and intelligence is more complex than might be expected. *“When it comes to cortical thickness, there is no simple relationship of bigger equals better,”* says Lerch. The

story is more complex: *“the way intelligence relates to cortical thickness is to be found in the time course and not necessarily at any one point of development. In fact, the young children in this study had an unexpected relationship between cortical thickness and IQ: the higher the IQ, the thinner the cortex. The thickening of the cortex was, however, more rapid over the next few years for these subjects.”* In other words, the most intelligent children had thin cortexes at a young age, but these thickened rapidly over time.

It’s important to understand, says Lerch, that these findings *cannot* be used to determine a specific child’s intelligence with an MRI scan of the brain. Rather, the data demonstrate a pattern of brain development that helps further the understanding of how intellectual ability develops at a neuro-anatomical level. *“One key lesson for parents and health-care professionals from this study would be to look at the dynamic time course of neuro-anatomical development,”* says Lerch. *“The large number of subjects in this study allowed us to draw inferences about the developmental time course of the thickness of the cortex and how it relates to intellectual ability. The key is that a more dynamic developmental pattern set apart the children with the highest IQs.”*

The research also highlights the fact that from very young ages right through adolescence, children are undergoing rapid changes in their cerebral cortex, and that the development of optimal intellect is probably at least partially dependent on these changes happening smoothly. As this could be a critical and vulnerable period for the development of intellect, it is important for children to receive good care, including proper nutrition and exposure to activities that stimulate thinking, to develop their intellects as fully as possible. 🦋

• BY ALISON PALKHIVALA



“When it comes to cortical thickness, there is no simple relationship of bigger equals better.”

Ref.: 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.

IDENTIFYING POTENTIALLY DEVIANT TEENS AS EARLY AS KINDERGARTEN

Boys who are likely to join deviant peer groups in early adolescence can be identified as early as kindergarten, highlighting the need for early prevention programs that target both individual and family risk factors.

A 12-year longitudinal study conducted in Montreal, revealed that 5-year-old boys from low socioeconomic areas who are hyperactive, fearless and who display low levels of prosocial behaviors, and are raised in adverse family environments, are much more likely to join deviant peer groups when they enter the teenage years.

The study is the first to show that behaviors evident as early as kindergarten are predictive of deviant peer involvement. It is also the first to examine the interaction between individual and family characteristics. A total of 1,037 French-speaking boys from low socioeconomic areas were assessed in kindergarten by their teachers, and then each year from ages 11 to 17 by self-report. Deviant peer involvement was defined as belonging to a group or gang that performed "reprehensible acts."

"We found that those who join deviant peer groups early in adolescence have individual and family characteristics in their childhood that make them more likely to follow this trajectory," says Dr. Éric Lacourse, a researcher in the department of sociology at the *Université de Montréal* and the study's lead author.

Specifically, kindergarten boys were at highest risk if they were hyperactive, fearless, and low on prosocial behaviors (i.e. lacking empathy or willingness to help others). They were much less at risk if they displayed only two of these three characteristics. Family adversity: poverty, low level of parental education, mother's young age at the first child, family separation early in the child's life, made no unique contribution, but increased the risk twofold when combined with a profile of all three behavior characteristics.

A CALL TO ACTION

Lacourse says these findings highlight the need for prevention programs that target



both individual and family risk factors early in childhood. *"We need to help disadvantaged families with difficult children,"* he points out. *"Often, help is given at school, but these families need particular help at home as well."*

Linda L. Nosbush, a former research coordinator for the Understanding the Early Years initiative in Prince Albert, is now the Social Development Manager for the City of Prince, Saskatchewan. She is also working on a national crime and gang prevention project. *"These latest research findings are a call to action,"* she says. *"If children's vulnerability can be identified early, the challenge is to prevent negative outcomes by operating in a cohesive and integrated manner in the four worlds of childhood—the home, the school, the peer group and the community. It is critical for our children to be supported in families, and families don't operate in isolation, but need the support of*

"We found that those who join deviant peer groups early in adolescence have individual and family characteristics in their childhood that make them more likely to follow this trajectory."

strong neighbourhoods," Nosbush emphasizes. *"Communities therefore need to provide a range of support systems, so that all children have an equal chance of success."* 🐾

• BY EVE KRAKOW

THE POLITICS OF A HEALTHY SOCIETY

Political systems that promote the redistribution of wealth and that closely control employment and labour markets have better health outcomes than those led by other democratic political systems, according to new research.

Charles Muntaner from the Centre for Addictions and Mental Health (CAMH) and the University of Toronto, and his colleagues, including Vicente Navarro and Haejoo Chung, analyzed the political systems and health outcomes of developed countries with a representative democracy and free market economy. They divided these coun-

tries into one of four categories, based on their political status between 1950 and 2000: social democratic, Christian democratic (or conservative), liberal, and authoritarian conservative (dictatorships). Canada fell under the 'liberal' category. The investigators then looked at how countries in each of these categories fared with respect to two key health outcomes – infant mortality and life expectancy at birth.

Countries with political policies designed to distribute wealth evenly across the population had lower infant mortality rates and higher life expectancies at birth. Countries with a social democratic government were the most dedicated to this sort of wealth redistribution and were more likely to have policies that promote full employment, closely regulate the labour market, and spend on public health. They were also more likely to

provide universal health and social benefits coverage.

On the other hand, liberal countries like Canada, which were less committed to wealth redistribution, fared better regarding these two health outcomes (infant mortality and life expectancy) only when compared to dictatorships. While Canada does offer universal healthcare and some social assistance, it is less aggressive than social democratic countries with respect to controlling employment and labour markets.

"This research suggests that Canada should avoid copying a privatized health care system such as in the US to guarantee the health of its children," says Muntaner. He also recommends that Canada use *"government resources to reduce child poverty."* 🦋

• BY PHILIP FINE AND ALISON PALKHIVALA

Ref.: Navarro V, Muntaner C, Borrell C, Benach J, Quiroga A, Rodriguez-Sanz M, Vergès N, Pasarin NI. Politics and health outcomes. *Lancet* 2006;368(9540):1033-1037.
Additional references: Chung, H., & Muntaner, C. (2006). Political and welfare state determinants of infant and child health indicators: An analysis of wealthy countries. *Social Science & Medicine* 63(3),829-842.
Chung, H., & Muntaner, C. (2007). Welfare state matters: A typological multilevel analysis of wealthy countries. *Health Policy* 80(2),328-339.

The Bulletin is a publication of the Centre of Excellence for Early Childhood Development, one of four Centres of Excellence for Children's Well-Being. Funding for the Centres of Excellence for Children's Well-Being is provided by the Public Health Agency of Canada. The opinions expressed in this publication are those of the authors/researchers and do not reflect necessarily the official views of the Public Health Agency of Canada.

The CEECD identifies and summarizes the best scientific work on social and emotional development of young children and makes this information available to service planners, service providers and policy-makers.

The Centre's partners are Université de Montréal, Fondation Lucie et André Chagnon, CHU Sainte-Justine Research Center, Canadian Paediatric Society, Montreal Children's Hospital, Canadian Child Care Federation, University of British Columbia, Institut national de santé publique du Québec, Dalhousie University, IWK Health Centre, Centre de Psycho-Éducation du Québec, Queen's University, First Nations of Quebec and Labrador Health and Social Services Commission, Invest in Kids, and Atkinson Center for Society and Child Development.

Editors: Lucie Beaupré and Richard E. Tremblay
Managing Editor: Claire Gascon-Giard
Collaborators: Tracey Arial, Philip Fine, Helena Katz, Eve Krakow, Alison Palkhivala
Copyeditors: Lana Crossman and Kathe Lieber
Scientific proofreading: William Fraser, Takako Fujioka, Prabhat Jha, Michael S. Kramer, Éric Lacourse, Carles Muntaner, Tim Oberlander, Saroj Saigal, Barbara Schmidt, Philip Shaw, José Villar
Layout: Guylaine Couture
Printing: QuadriScan

Centre of Excellence for Early Childhood Development
GRIP-Université de Montréal
P.O. Box 6128, Succursale Centre-ville
Montreal (Quebec) H3C 3J7
Telephone: 514.343.6111, extension 5378
Fax: 514.343.6962
E-mail: cedje-ceecd@umontreal.ca
Web site: www.excellence-earlychildhood.ca
ISSN 1499-6219
ISSN 1499-6227