

Brain development, child development – Adult health and well-being and paediatrics

The articles by Williams (pages 522-524) and Offord and Lipman (pages 526-530) in the present issue of *Paediatrics & Child Health* pose an interesting challenge for medicine and paediatrics, in particular. The authors set out a relationship between child development and problems in later stages of life.

Health professionals, such as paediatricians, are trained to identify individual health problems, and to provide advice and appropriate therapeutic regimens. Paediatricians working in large paediatric hospitals provide effective programs to help children with serious disorders, including disorders arising from genetic and congenital defects. It is difficult for paediatricians to be as effective in the area of early child development before mental and physical health problems manifest themselves.

Paediatricians, particularly those in child psychiatry, see children with behavioural problems that frequently result from living in deprived or dysfunctional families during early childhood. While many of these children can be given some help, the diagnosis and management of the behavioural problems does not always cure the problem and restore normal development. Paul Steinhauer, a child psychiatrist at The Hospital for Sick Children, in Toronto, Ontario has fought hard to have his profession recognize that improving the circumstances for child development in the early years could reduce the number of referrals to treat children with problems that he receives for which he is limited in what he can do. The articles by Williams, and Offord and Lipman reinforce the importance of this argument.

Today, the enhanced understanding of how the quality of a child's development in early life (1,2) influences the basis for developing competence and coping skills throughout life has reinforced the importance of the early years of child development to health and well-being throughout life. The growing appreciation of how the signals from the sensing systems to the brain in the early

years influence the wiring and sculpting of the neurons in the brain (3) has started to improve the understanding of how brain development in the early years may influence learning, behaviour and health throughout the life cycle.

Children raised in dysfunctional families, regardless of socioeconomic class, are at increased risk for mental health or behaviour problems in later life (4-6). Considerable evidence indicates that the early years of life, including the in utero period, influence the risks for many physical and mental health problems that are experienced in adult life (1,7). Through research (8,9) in what is often referred to as psychoneuroendocrinology and psychoneuroimmunology, the biological pathways that can help explain the relationship between the brain, and physical and mental health problems are beginning to be understood.

The causes of inequalities in health, particularly in countries with universal public health care insurance, are of considerable interest (1,10). Measures of population health assessed against a population's socioeconomic status show a clear gradient that does not appear to be significantly influenced by health care (2). Measures of cognitive and behavioural development in children are also a gradient when assessed against the socioeconomic status of children (2,11). This social partitioning of health and measures of child development poses many interesting questions. For example, are the gradients in adult health and child development related to a common factor such as the development and functioning of the brain? The answer to this question is not yet known. What is known is that the slope of these gradients varies across countries and that there is no poverty threshold. Some countries have less inequality in human development and health. Studies of birth cohorts indicate that some of the health gradients seen in early life can be related to early childhood development (2,7). It seems likely that conditions that influence early child development contribute to inequalities in health.

Williams, and Offord and Lipman highlight the fact that estimates of development (verbal skills, mathematical skills, literacy and behaviour) are a gradient when assessed against socioeconomic indicators. The authors point out that there is no cut off or threshold that would be expected if poverty were the prime factor causing poor early child development. In the assessment of children for the *Early Years Study* in Ontario (11), it was found that while 35% of children in the bottom 25% of family income are in difficulty in terms of early childhood development, more than 20% of children in the top quartile of family income experience poor development. As Offord and Lipman point out, just tackling those in "so called poverty" will only affect a small proportion of children in difficulty in terms of early child development. The greatest number of children in difficulty are in the middle class. This has implications for the concepts of who is at risk and whether interventions to enhance early child development should be targeted to particular groups. The *Early Years Study* reference group (11) concluded that programs to provide good early child development should be available and accessible to all families.

One of the important questions generated by the findings of the *Early Years Study* was why 65% of children in the low income families showed good development? When assessing what appears to influence the socioeconomic gradient in development, it was found that family income did not explain the gradient; this is not surprising in view of the number of children in middle income families who experience difficulties. The quality of parenting was a major factor influencing the gradient. This is not surprising because parents have the greatest affect on brain and child development in the critical early years.

Should paediatricians who are trained to help ill children and their families become involved in societal initiatives to improve early child development for all children, and to help reduce mental and physical health problems

throughout the life cycle? Williams, and Offord and Lipman argue that paediatricians should be part of community initiatives to improve early child development and parenting. They have suggested ways that paediatricians can work in partnership with others in the community. Paediatricians enjoy a long history of providing leadership in their communities to improve the outcomes for children in the early years. The new evidence set out in the Williams, and Offord and Lipman articles outlines both the opportunity and the need for paediatricians to work with parents and various community groups to help put in place early child development and parenting centres that are accessible to all children in their communities.

J Fraser Mustard MD
Canadian Institute for Advanced Research
Toronto, Ontario

REFERENCES

1. Acheson D. Independent Inquiry into Inequalities in Health Report. London: The Stationery Office, 1998.
2. Keating D, Hertzman C, eds. Developmental Health and the Wealth of Nations. New York: Guilford Press, 1999.
3. Cynader M, Frost B. Mechanisms of brain development: Neuronal sculpting by the physical and social environment. In: Keating D, Hertzman C, eds. Developmental Health and the Wealth of Nations. New York: Guilford Press, 1999:153-84.
4. Maughan B, McCarthy G. Childhood adversities and psychosocial disorders. *Br Med Bull* 1997;53:156-69.
5. Rutter M, Giller H, Hagell A. Antisocial Behaviour by Young People. Cambridge: Cambridge University Press, 1998.
6. Tremblay R. When children's social development fails. In: Keating D, Hertzman, C, eds. Developmental Health and the Wealth of Nations. New York: Guilford Press, 1999:55-71.
7. Power C, Hertzman C. Social and biological pathways linking early life and adult disease. *Br Med Bull* 1997;53:210-21.
8. McEwen B, Schmeck H. The Hostage Brain. New York: The Rockefeller University Press, 1994.
9. McEwen B. Protective and damaging effects of stress mediators. *N Engl J Med* 1998;338:171-9.
10. Evans R, Marmor T, Barer M. Why Are Some People Healthy and Others Not. New York: Aldine de Gruyter, 1994.
11. McCain MN, Mustard JF. Early Years Study, Reversing the Real Brain Drain. Toronto: Publications Ontario, 1999.