Does Childhood Environment Generate Cardiovascular Risk in Men? Hong Kong as a Natural Experiment in Epidemiological Time

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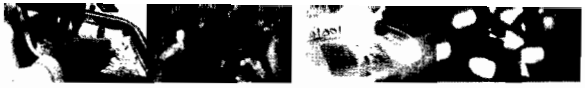
After graduating in Pure Maths and Medieval History from the University of St Andrews, Mary Schooling worked briefly in health planning in the UK. Her doctoral thesis at University College London was on how the interplay between social context and self-concept in adolescence affects adult health behaviour. Her main research interests lie in the effect of social and historical forces over the life course on disease risk; for which southern China with its unique history is a fascinating research location.

The pattern of sex differences in ischaemic heart disease (IHD) mortality has changed over the 20th century and varies with geo-ethnic location, for example being less marked in places at an earlier stage of economic development. Although oestrogens are thought to play a role, it has also been suggested that sex differences in IHD are the result of macro environmental influences. However, it is not clear what environmental exposures are responsible or given the lifetime development of IHD, which exposures during adulthood or childhood are more relevant.

The Chinese population of Hong Kong provides a natural experiment for distinguishing between childhood and adulthood environmental exposures in the development of cardiovascular disease. The Chinese in Hong Kong share language, culture, cuisine and ethnicity, but some grew up in Hong Kong and some are migrants from the surrounding province of Guangdong. The two locations were profoundly different, politically and economically, when these adults were growing up. Hong Kong was economically at a later stage of development and had a much higher gross domestic product per head. Thus we have two groups sharing a similar adult environment in Hong Kong, where there is little social patterning of IHD, but whose growth and development took place in different environments, corresponding to different epidemiologic transitional stages.

We used multivariable linear regression to examine the relation between place of birth and growth in men and women and measures of cardiovascular risk in a representative, cross-sectional sample of 2900 Chinese adults currently living in Hong Kong. To be conservative, we only considered adults who were born and brought up in Hong Kong or Guangdong, and excluded anyone who migrated to Hong Kong during childhood or adolescence, i.e. before age 20, giving 1586 and 483 born and brought up in Hong Kong and Guangdong respectively; 998 men and 1075 women. Adjusted for age, education, job type, leisure exercise, smoking status, use of alcohol and where appropriate relevant medication use, in men birth and growth in Hong Kong compared with Guangdong was associated with higher systolic blood pressure (mean difference 4.14mm Hg, 95% CI 1.73-6.56), higher diastolic blood pressure (mean difference 2.27mm Hg, 95% CI 0.68-3.85) and higher triglycerides levels, whilst there was no such effect in women. These relationships were little changed by adjustment for measures of adiposity, i.e. body mass index or waist circumference.

These findings, taking advantage of a unique natural experiment in epidemiological time, suggest that sex differences in IHD may be partially due to environmental impacts during growth. Absence of a relationship in



women suggests the effect is specific to men. There are two possible socio-biological explanations. Accelerated growth is associated with IHD risk, which better living conditions in Hong Kong could have promoted. There is little reason to think accelerated growth has different effects by sex. Nevertheless better living conditions in Hong Kong could have intensified pubertal development, mechanistically expressed through higher levels of sex hormones and specifically testosterone in boys, thereby promoting anabolic growth, sexual dimorphism and possibly permanently altering IHD risk factors, such as blood pressure which is higher in boys emerging from puberty. These biological, possibly hormone-specific effects of improved living conditions would be different in pubertal girls. In addition or alternatively, in a male orientated traditional Chinese culture boys growing up in Hong Kong may have received preferential feeding and thus had more opportunity for accelerated growth than girls. In conclusion we speculate that better childhood and adolescent environments enable accelerated growth and/or greater sexual dimorphism in males, which permanently changes IHD risk factors and generates the observed sex differences in IHD risk, thus explaining why sex differences in IHD emerge following economic development.