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hypothesis. Nevertheless, the analyses were not restricted only to one year periods but, as indicated in the last paragraph of the results, they also included data for a two year period. No evidence for an effect of pollution on health was found.

(D) Goldsmith and Toeplitz have misunderstood the application of work on regression to the mean. Unlike the study described by Chinn and Heller, in which changes in plasma cholesterol were analysed according to initial concentrations of plasma cholesterol, we did not select children for the analyses by initial number of respiratory conditions. The effect of age was considered in the longitudinal analysis and was discussed in the section “choice of data for analysis.”

(E) It should be clear that our conclusions are not as sweeping as Goldsmith and Toeplitz claim. We said that the evidence from our studies suggested that the pollution levels in the areas were below those necessary to harm health. Obviously our results are not proof of this and are subject to all the usual limitations of observational studies that Goldsmith and Toeplitz know as well as we do.

References


Birth order as a quantitative expression of date of birth

SIR—The article by Berglin1 exposing a persistently overlooked fallacy in the interpretation of alleged effects of birth order is to be welcomed as a major contribution on this difficult problem. The monograph2 presenting the work in greater detail is essential for those subsequently working in this area, and deals with many more pitfalls than it is possible to outline in a single paper.

It must be borne in mind, as Berglin himself points out,2 that artefacts concerned in the estimation of birth order effects in adults are entirely different from those relevant to studies in the perinatal period, just as the methodology is necessarily different; the expression (r–1)/s is meaningful only in complete sibships. Indeed, in perinatal studies apparent parity effects must be assessed in the light of the fact that women with good reproductive histories tend to stop having pregnancies sooner than those with poor histories,3 yet this effect also invalidates longitudinal studies that control for the total number of pregnancies a woman has.4

The traits to which Berglin envisages his methods should be applied, such as eminence or alcoholism, have certain distinctive properties. They are not manifest at birth but appear at some (perhaps poorly defined) age of “onset” that varies between affected individuals. The traits are such that once such a label is attached to an individual it is not subsequently erased—in the terminology of stochastic processes, an “absorbing state.”

Accordingly two effects may be expected:

(a) As pointed out by Berglin, in a study restricted to individuals born in a period in which the mean value of (r–1)/s is less than ½ earlyborns with the trait will tend to outnumber lateborns, and vice versa.

(b) The relationship of predicted mean position (PMP) against year of birth is locally sinusoidal, with a similar, certainly non-trivial, derivative. So if a study population consists of individuals born during a period in which PMP varies across ½, birth order will be confounded with age and hence with the degree of opportunity to have passed from the initial (negative) to the absorbing (positive) state.

To give a concrete example: the estimated number of heterozygotes for Huntington’s chorea born each year in Glamorgan and Gwent did not show any clear trend during the period 1920–50.5 From Berglin’s table 2 we may estimate a mean PMP of 0.532 for the period 1920–35, 0.464 for 1935–50, 0.498 for the whole 30 year period. A study based on births from 1920–35 would tend to show an excess of later born, while one for 1935–50 would tend to show an excess of first born. If we assume that the PMP values for Gothenburg apply to South Wales also, a study with ascertainment date 1980 based on births occurring during the whole period, considering a disease such as Huntington’s chorea with a mean age at onset of around 45 years4 and a standard deviation of 12 years would be expected to give a weighted mean PMP, based on manifest cases, of 0.513. In this instance, effect (b), though smaller than effect (a), is not inconsiderable, and for conditions for which the
variation in age at onset is less, the relative importance of this secondary effect will be greater.

ROBERT NEWCOMBE
Department of Medical Statistics
Welsh National School of Medicine
Cardiff CF4 4XN

References


