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Book Review

The Interactions of Smoking, Environment, and Heredity and Their Implications for Disease Etiology: A Report of Epidemiological Studies on the Swedish Twin Registries

By Rune Cederlöf, Lars Friberg, Torbjörn Lundman (Stockholm). Published in mimeographed form by the Department of Environmental Hygiene of the Karolinska Institute, Stockholm 1977; also published as Supplement No 612 to Acta Medica Scandinavica. Soft cover, 17 × 24 cm, 128 pp. Price not indicated.

Smoking has been generally associated with a variety of diseases in epidemiologic studies, and some think that it is a filthy habit that should be banned. These truths do not absolve researchers from the responsibility to clarify the mechanisms behind the associations with illness. Social concern over health effects of smoking has led to extensive support of research on the subject. This concern deserves to be met by a broad conceptual approach that does not ignore complexities. "The Interactions of Smoking, Environment and Heredity" by Rune Cederlöf, Lars Friberg, and Torbjörn Lundman is a well organized account of a competent expedition into this territory. The research being reported was mainly carried out on registries of Swedish twins maintained at the Karolinska Institute in Stockholm.

The difficulty of the task is exemplified by the smoking and lung cancer controversy of two decades ago. Among others, Sir Ronald Fisher applied his unquestionable genius to the exploration of this association [1]. He strongly supported the view that smokers used cigarettes to soothe their exceptionally sensitive respiratory systems, and because of this genetically determined predisposition they were at a high risk of lung cancer. We have not yet arrived at the final truth regarding the etiology of lung cancer and the role of genetic factors in that disease. However, even though the specific process by which smoking induces lung cancer is not known, it is now generally accepted that smoking is not only a powerful predictor but also predominantly the direct cause of that disease.

Today, few accept Fisher's thesis that the association of smoking with lung cancer is mediated by genetic factors. It remains possible, however, that associations of other diseases with smoking may be strongly affected by such factors. Cederlöf and his coauthors do indeed present ample evidence that smokers and nonsmokers differ on many social characteristics, psychological traits and environmental exposures. Many of the variables seem to be, to some degree, genetically determined, and they very likely have important effects on health. Obviously these are complex relationships, most likely different for different diseases. Compiling a firm empirical data base, such as is summarized in this report, is a good beginning for unravelling some of these relationships.

The subjects in the Swedish registry were identified through birth records in two separate, and somewhat different, operations. The first compilation, in 1961, includes 12,899 pairs born in 1886–1895, and the second, in 1973, 21,147 pairs born in 1958–1961. Both male and female same-sex twin pairs have been included. Data have been collected through questionnaires, standardized psychological scales, clinical examinations of subsamples, police registrations of alcohol abuse, and centralized death certificate files. Areas of study include smoking, alcohol use, physical activity, employment history and occupational adjustment, food habits, use of medication and psychosocial variables. The medical end points covered are anginal and respiratory symptoms, clinical or laboratory assessments of cardiac and respiratory function and cause-specific mortality certifications.

Twin pairs have been classified as monozygotic or dizygotic on the basis of questionnaire responses. When validated against laboratory methods of zygosity determination, the questionnaire classification was confirmed in well over 90% of such comparisons, within the range of the accuracy of the laboratory methods. This is consistent with other evaluations of self-classification of zygosity by adult twins [2, 3, 4]. Much of the power of epidemiologic research on twins is due to the exclusion of genetic factors in comparisons using monozygotic pairs whose members differ on traits or exposures of interest. Such within-twin-pair comparisons are also perfectly matched on age and tend to exclude variation due to many familial, developmental, and social factors. Some of the latter factors cannot be explicitly determined and thus they cannot be controlled by other methodologies. Numerous such within-twin comparisons by zygosity are presented in this publication with extensive elaborations of the basic method.

There are some deficiencies. Methodologic problems are considered carefully in the beginning sections of this report, but relating them more closely to some of the discussion of results would have been helpful. Because of the very structured nature of analyses involving within-twin-pair comparisons, these analyses often involve small numbers. The frequent use of risk ratios and ratios of coincidence rates leads to a compact presentation that tends to be obscure. Some of the basic data in terms of numeric counts would have been helpful. It is not always clear what portion of the entire registry is involved in which comparison. However, more detailed data can generally be obtained from the published studies cited.

Despite these shortcomings, the report is valuable. Its most important contribution is in providing an organized summary of a complex body of research with a unique methodology. When the results agree with those of conventional epidemiologic studies, this provides a strong confirmation of both approaches. When they disagree, this will hopefully raise important questions that will stimulate fruitful future research.

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