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An Epidemiological Perspective of Psychosocial Factors in Disease Etiology

JOHN CASSEL, MD, MPH

Introduction

Throughout history there has been a conviction in medicine that certain environmental factors are important in the etiology of disease. The specific factors deemed worthy of study, however, have varied considerably over time from the "airs waters places" of Hippocratic times to the microorganisms and microchemicals of today. Quite clearly, the factors selected for study (from an almost infinite number that could be selected) are heavily dependent upon the existing theories of the nature of disease and its causes and the existing technology. Comparatively recent findings tend to suggest that we need to modify some of these existing theories to allow for the possibility that one of the more important, and hitherto unconsidered, aspects of the environment for man (from a disease etiology point of view) may be the presence of other members of the same species.

Animal Overcrowding

Paradoxically, some of the more convincing evidence supporting this point of view comes from animal studies. To a large extent, these have been concerned with variations in the size of the group in which the animals interact and in situations which lead to confusion over territorial control. A number of investigators have shown, for example, that as the number of animals housed together increases, with all other factors such as genetic stock, diet, temperature, and sanitation kept constant, maternal and infant mortality rates rise, the incidence of arteriosclerosis increases, resistance to a wide variety of insults, including drugs, microorganisms, and X-rays decreases, and there is an increased susceptibility to various types of neoplasia.[3] Lack of territorial control has been shown to lead to the development of marked and persistent hypertension in mice, to increased maternal and infant mortality rates, and to reduced resistance to bacterial infections and decreased longevity.[14]

In addition to demonstrating the health effects of variations of the social milieu, further animal studies have provided clues to the processes through which they may be produced. Changes in group membership and the quality of group relationships have been shown to be accompanied by neuroendocrine changes, particularly, but not exclusively, by changes in the pituitary and adrenal-cortical systems.[15,16] The changes in some of these hormones, such as the 17-hydroxycorticosteroids and the catecholamines, especially if prolonged, can, in turn, markedly alter the homeostatic mechanisms of the body and the responses to a wide variety of stimuli. The evidence, then, from a series of studies seems to be sound methodologically and reasonable from a biological point of view.

Relation of Human Environment to Health

Convincing as this animal work appears to be, the relevance of these findings to human health, however, is as

Dr. Cassel is Professor and Chairman, Department of Epidemiology, University of North Carolina School of Public Health, Chapel Hill, North Carolina 27514.

yet unproved, and considerable doubt exists as to the appropriate analogs in the human social system. Attempts, for example, to demonstrate that increased population density and crowding are related to poorer health status have been unconvincing and have led to confusing and often conflicting results.[17] A careful review of some of these studies taken in conjunction with the animal work would suggest that for a future research in this area to be profitable we should abandon a search for the direct human counterpart to animal crowding or territorial confusion and concentrate instead on some more general principles, or hypotheses, that can be derived from these data. In my view, four such principles seem worth considering.

Social Disorganization

The first of these can perhaps best be stated as a hypothesis. This holds that the social process linking high population density to enhanced susceptibility to disease is not the crowding per se but the disordered relationships that, in animals, are inevitable consequences of such crowding. These, while being manifested by a wide variety of bizarre and unusual behaviors, often have in common a failure to elicit anticipated responses to what were previously appropriate cues and an increasing disregard of traditional obligations and rights. The failure of behavior patterns to accomplish their intended results (i.e., to lead to predictable responses on the part of others) leads frequently to repetition of these behaviors with, presumably, concomitant chronic alterations in the autonomic nervous system activity and hormonal secretions associated with such activity. This hypothesis suggests that in human populations the circumstances in which increased susceptibility to disease would occur would be those in which there is some evidence of social disorganization. This, while still being far from a precise term which can be accurately measured, has proved to be a useful concept in a number of studies. In the hands of several investigators, for example, various indicators of social or familial disorganization have been related to increased rates of tuberculosis,[18] mental disorders,[19] deaths from a stroke,[20] and prevalence of hypertension[21] and of coronary heart disease.[22-24] Clearly more work needs to be done in clarifying and quantifying this concept, but until there is recognition of what needs to be clarified or quantified, little progress can be anticipated.

Domination and Subordination

The second general principle which emerges from the animal work is that not all members of a population are equally susceptible to the effects of these social processes. Systematic and regular differences have been observed, with the more dominant animals showing the least effects and the subordinate ones having the most extreme responses.[25] Those differences are manifest both in the magnitude of the endocrine changes and in increased morbidity and mortality rates. Conceivably these findings may, in part, explain the high levels of blood pressure found in American Negroes who not only usually occupy a subordinate position in society but whose lives are frequently characterized by considerable evidence of social and familial disorganization. At the very least, such findings suggest that studies aimed at identifying the health consequences of migration should distinguish those migrants who occupy subordinate positions in their host countries from those who occupy positions of power or prestige.

Social Buffers

The third principle is concerned with the available protective factors, those devices which buffer or cushion the individual from the physiological or psychological consequences of social disorganization. These seem to be of two general categories, biological and social. Under biological would be included the adaptive capacities of all living organisms, the capacity, given time, to adjust physiologically and psychologically to a wide variety of environmental circumstances. In animals this is illustrated by the higher responses of laboratory naive animals to given stimuli than of veteran animals[26] and by the much lower rate of pathology in animals born and reared in crowded conditions than in animals transferred to these conditions some time after birth.[27] In humans, the finding that death rates from lung cancer in the U.S., when controlled for cigarette smoking, are considerably higher in the farm-born who migrated to cities than in lifetime urban dwellers (despite the longer exposure of the latter to atmospheric pollution)[28] seems to be evidence of the same phenomenon.

In addition to these biological adaptive processes, various social processes have also been shown to be portective. Chief among these are the nature and strength of the group supports provided to the individual. In rats, for example, the efficacy with which an unanticipated series of electric shocks (given to animals previously conditioned to avoid them) can produce peptic ulcers is determined, to a large extent, by whether the animals are shocked in isolation (high ulcer rates) or in the presence of littermates (low ulcer rates).[29] The territorial conflict and elevated blood pressures which were mentioned previously were produced by placing mice in intercommunicating boxes. These results, however, were only obtained when the mice were "strangers." Populating the system with littermates produced none of these effects.[14] In humans, small group studies have shown that the degree of autonomic arousal which can be produced by requiring solutions to what in reality are insoluble tasks is more extreme if the group is made up of strangers than when it is made up of friends.[30] Modern studies on the epidemiology of tuberculosis in the United States and Britain have shown that the disease occurs more frequently in "marginal" people, that is in those people who for a variety of reasons are deprived of meaningful social contacts.[18,31]

If these three principles, or hypotheses, were correct, it would imply that the health consequences of social disorganization will not be universal, affecting all people in the same manner. A more adequate formulation would hold that such consequences would be dependent on:

- The importance or salience of the relationships that become disordered under conditions of social disorganization;
- The position of the individuals experiencing such disordered relationships in the status hierarchy;
- The degree to which the population under study has been unprepared by previous experience for this particular situation (i.e., has had insufficient time to adapt);
- The nature and strength of the available group supports.

Generalized Stress

The final general principle that can be derived from the animal experiments relates to the manifestations of ill health that might be anticipated under conditions of social change and disorganization. The model of disease causation provided by the germ theory has accustomed us to think in monoetiological, specific terms. Accordingly, much of the work concerned with social or psychological antecedents to disease has attempted to identify a particular situational set (usually labeled "stress" or "a stressor") which would have a specific causal relationship to some clinical entity, analogous, say, to the relationship between the typhoid bacillus and typhoid fever. Such a formulation appears to be clearly at variance with the animal data, a striking feature of which is the wide variety of pathological conditions that emerge following changes in the social milieu. A conclusion more in accordance with the known evidence, then, would be that such variations in group relationships, rather than having a specific etiological role, would enhance susceptibility to disease in general. The specific manifestations of disease would be a function of the genetic predisposition of the individuals and the nature of the physicochemical or microbiological insults they encounter. This concept of generalized susceptibility would be consistent with the situation in the United States where it has recently been demonstrated that those regions of the country having the highest death rates from cardiovascular disease (age-, race-, sex-specific) also have higher than expected death rates from all causes, including cancer and infectious diseases.* This illustration, of course, does not necessarily document that social processes are responsible for such an increased susceptibility, but does lend credence to the view that variations in generalized susceptibility may be a useful concept. Somewhat more direct evidence is provided in industrial studies in the U.S. which have shown that managers in a company who, by virtue of their family background and educational experience, were least well prepared for the demands and expectations of executive industrial life had the highest rates of all diseases—major as well as minor, physical illness as well as mental, long term as well as short term.[3 2]

Presumably, then, the causes of disease may vary under different conditions. In preindustrial societies, living in small, tightly organized communities, the exposure to highly potent disease agents may account for the major part of disease causation. Under these circumstances variations in susceptibility due to social processes may be of relatively little importance. With increasing culture contact, populations become increasingly protected from such disease agents but simultaneously exposed to the social processes discussed above. Variations in susceptibility now assume greater importance in the etiological picture and the concomitant changes in such factors as diet, physical activity, and cigarette smoking will facilitate the emergence of new manifestations of such susceptibility.

The overall formulation as developed in this paper leaves unanswered a number of crucial questions, some of which may be answered empirically. How long, for example, does it take for this postulated period of adaptation to the new situation to occur? Decades or generations? To what extent can strengthening the social supports overcome the presumptive, deleterious effects of the disordered relationships? Would modifications in diet (by lowering fat or salt, for example) lead to a reduction in certain manifestations (cardiovascular disease and hypertension) only to be replaced by other manifestations of the postulated increased susceptibility? It seems that many elements of this general scheme could well be tested and some of the unanswered questions resolved in areas of rapid social change, particularly in cases of rural urban migration and increasing urbanization and industrialization of previously rural areas.

* Syme, S. L. Personal communication.

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Behavioral Factors Associated with the Etiology of Physical Disease: A Social Epidemiological Approach

S. LEONARD SYME, PhD

Introduction

Epidemiology may be defined as the study of the distribution of disease in the population and of the factors which affect this distribution. Social epidemiology may be defined as the study of social factors as they affect distributions of disease. More precisely, the concern of social epidemiology is to investigate the ways in which a person's position in the social structure influences the likelihood that he will develop disease.

This is a very general definition and encompasses a wide range of research activity. Thus, social epidemiologists have focused attention on a variety of diseases such as heart disease, arthritis, cancer, ulcers, hypertension, and so on. Further, the social epidemiologist has studied these diseases from various theoretical viewpoints ranging from descrip-

Dr. Syme is Professor of Epidemiology, School of Public Health, University of California, Berkeley, California 94720.