

The Structural Ecology of Health and Community

By Frank W. Young

The Internet-First University Press
Ithaca, NY

The Internet-First University Press, Cornell University, Ithaca, New York 14853.

<http://ecommons.library.cornell.edu/handle/1813/62>

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Printed in the United States of America

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Frank W. Young

Cornell University

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2009

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INTRODUCTION

I first became interested in the social causation of health in the context of development studies, where the central question was and still is “Why are some communities better off than others?” “Better off” was understood to mean income and wealth, but around 1970 the range of criteria was enlarged to include the “physical quality of life,” especially life expectancy and infant mortality. The new criteria opened the door to broader sociological research on development and to the study of what we now call “population health.”

My research on adult and infant mortality rates prompted a review of the kind of theory that epidemiologists and medical researchers invoked to explain their findings. To my surprise, I could find no comprehensive statement of their position. It was almost as if Pasteur and Koch had said it all when they formulated the germ theory of disease. Only a few scattered references suggested the core idea of the biomedical model, which I take to be the “balance of power” between the body’s “host resistance” (i.e. the immune system) and the “proximate determinants”—germs, contamination, malnutrition, etc.—that originate in the environment and sometimes cause illness. In the more recent literature—what is now called “social epidemiology”—social variables like poverty, crowded housing, and lack of access to medical care accentuate the effect of the proximate determinants, while variables like education and social participation reinforce host resistance.

Development researchers were clearly moving in a different direction when they emphasized the social organization of communities and nations and paid little or no attention to diseases and the physiology of resistance. The closest these macro studies came to the biomedical model was to include measures of health care facilities in the equations, and to report either that they did not predict criteria like life expectancy or that the sign of the coefficient was the opposite of what everyone expected.

Gradually I began to realize that the sociological explanation for human development that I was exploring diverged from the core ideas of the biomedical model. The sociological model assigned causal primacy to variables like urbanization, democracy, ethnic solidarity and, as aggregated measures of individual and household organization, years of schooling and income. According to sociological theory, curative health technology was secondary, and it was not even necessary to take account of the proximate determinants. With large samples of communities, they tended to “randomize out.” In short, the sociological explanation did not need the biomedical variables.

It also became clear that the various “population health” rates that sociological theory attempted to explain were different in kind from either the disease rates that epidemiologists tracked around the world or the sick people that doctors saw in their clinical practice. Disease rates emphasized organs and systems and not the whole person, while clinical practice is just that: curing the sick individual. Focusing on population health—molar rates across comparable communities—opened the door to research on positive health, the abundant energy and mental alertness that we call vitality.

But the macrosocial perspective posed a particular problem because research on nations, provinces, cities and smaller communities ignored individuals, yet health refers to individuals. How to bridge the gap? The answer this book gives is that successful community problem-solving moderates the personal habits that regulate the average level of biological functioning, which in turn determines rates of positive health. Moreover, the whole sequence can be conceptualized as an attribute of community organization that reproduces itself at all community levels, from the household to the nation-state. Unlike the biomedical model, the sequence does not involve a “reduction” from community structure to physiological processes and then up to population health rates.

Many readers and most advocates of the currently dominant “social determinants” position (which merges the newly discovered social factors with the classical biomedical model of disease) may interpret all this as a squabble between two kinds of social scientists, those who believe that adequate explanations must rest on individual attributes and those, like the author, who believe that explanations of emergent properties like population health must turn on properties of groups. This is an old debate in sociology and “methodological individualism” is currently dominant. But, of course, the “methodological structuralism” alternative has not yet been applied to health. This book attempts to do so.

Making the case for a community-grounded explanation of population health is not easy when almost all the empirical studies have been guided by the expanded biomedical model. Complete tests of the structural theory are still in the future. Consequently, this exposition of structural ecology as applied to health is mainly theoretical and illustrative. But that is as it should be because the central claim of this book is that it introduces, for the first time, an alternative explanation of population health. Or more precisely, of positive health, since structural theory does not challenge the biomedical explanation of disease.

Sociological theory can rarely be presented as unadorned abstractions. Consequently, the exposition includes case studies and quantitative comparisons whenever possible. In addition, it critically examines the expanded biomedical model and explains how the structural explanation is better at predicting positive health. A major thrust of this critique is the resolution of a central empirical problem in social epidemiology: why does socioeconomic status consistently predict population health wherever it has been tested and regardless of the type of measurement? Drawing on the literature, I review the answers that biomedical theorists have offered and compare them to the accepted dimensions of the SES problem. I conclude that the social determinants–biomedical attempts at explaining the SES effect have all failed. In particular, they have not explained the “gradient effect,” which is the stair-step relationship of years of schooling (and other indicators of SES) and increasing population health when displayed graphically (see Figure 4.1 for an example). I contend that the structural theory contained in this book does this. It explains why each additional year of school, regardless of school quality, geographical location and phase in the life cycle, increases life expectancy. If readers with a taste for the history of science would like to examine what I believe is a classical Kuhnian anomaly and an explanation that seeks to overthrow (part of) the biomedical paradigm, they should read Chapter 4 first.

The solution to the SES puzzle is easy once the structural theory of community and health is laid out because it is simply a special case of the general model. In fact, once understood, the model can be used to explain the “doctor-death” correlation: the persistent finding that the number of doctors (standardized) correlates positively with mortality rates. Although no one seriously believed that this correlation reflected a causal relationship, it is still a relief to be able to discard this manifestly spurious (and embarrassing) association.

Other interpretations and examples are presented which should interest almost anyone familiar with the health literature. For example, I reanalyze the data from Roseto, the Pennsylvania town with the very low heart disease death rates, and find that the explanation that epidemiologists have proposed does not fit the facts. In the same vein, the health practices of the Mormons in Utah and the Jewish immigrants in East London are examined in terms of structural theory, with the conclusion that one does not have to know the details of exercise, diet, addictions and the like to understand why they did so well. And finally, this book concludes with a practical idea: the creation of a new branch of public health, one that focuses on the pernicious health effects of threats to communities (e.g. economic downsizing, shifts of population composition, etc.) and the social problems, such as youth gangs, that erupt and cause premature deaths to all the members of the community.

In addition to the many specific ideas that a new perspective introduces, this book outlines a new attempt to adapt Darwinian thinking to human groups. In a review of the history of the application of the Darwinian paradigm to the social sciences, Dawson (2002) identified two periods. The first was “social Darwinianism” in the sense of the survival of the fittest individuals. Social scientists elaborated and actively promulgated this extension from about 1850 to 1914, with some even supporting the excesses of “eugenics” experiments. The second was “sociobiology,” which began about 1970 and claimed that the genetic structure that humans achieved up to about 10,000 years ago, when the era of hunting and gathering ended in most parts of the world, continues to influence behavior in significant ways. Dawson then introduced a third paradigm which he calls “neo-social-Darwinianism,” a line of thought that focuses on the role of warfare and other such competitive advantages in human evolution. This perspective recognizes the community as a unit of adaptation and the role of institutions in that process, but it does not break with the tradition of equating institutions with biological mutations.

It is tempting to treat institutions as elements in adaptation because the technologies for warfare, agriculture, industry, health, and the like deal with the changing environment, a process that bears a family resemblance to Darwinian natural selection. But the selectionist model provides no guidance for identifying the institutions that make a difference in adaptation. Military innovations, for example, typically appear as components of larger complexes that include changes in leadership, government support, and troop reorganization. It is difficult to identify in advance which element made the difference, and if this cannot be done, the theorist slips into circular reasoning, claiming that the institutions that contributed to successful adaptation must have been potentially adaptive. The structural remedy for this flaw is to point out that in addition to their role in transacting with the environment, institutions fit formal dimensions of general “problem-solving capacity.” One such dimension is the differentiation of occupations and, more

generally, the social division of labor. Other dimensions are pluralism, in the sense of political contestation, and solidarity, the degree to which institutions are coordinated by core beliefs. All these dimensions are brought together in the general hypothesis that the mutual reinforcement of one or more structural dimensions with appropriate concrete agencies determines the level of population health. That is, the combination of general and specific problem-solving capacity determines adaptation.

“Structural ecology” introduces another modification of the Darwinian explanation by substituting population health for reproductive superiority. Although some national groups seem to believe in the desirability of increasing the size of the population, their ranks are dwindling. The increasing economic competition among nations, along with a worldwide acceptance of the “middle-class standard of living,” works against the high fertility goal. Instead, governments and families look for quality offspring, an ideal that is spreading around the world, sometimes superseding wealth as a family and community goal. Structural ecology accepts this emerging consensus and incorporates it into its tests of hypotheses as the master criterion of organizational performance. Communities can be assessed in many other ways, but population health is the all-purpose measure of community adaptation.

Beyond the Darwinian transposition to human communities, there is another idea that drives this book: the structure of communities determines population health levels. More precisely, the problem-solving capacity of communities in dealing with existential threats determines levels of non-disease-based health. This statement implies another type of health—vitality—and a causal sequence that bypasses the biomedical emphasis on the shifting ratio of immune system strength and pathogen threats. The new idea here is that another causal sequence exists. Kaplan (2000:47) seems to have arrived at a similar position when he states: “In contrast to the traditional biomedical model, behaviors or biological events may affect life expectancy independently of disease processes...The outcomes model emphasizes quality of life and life duration instead of clinical measures of disease process.”

Although this book accepts the biomedical model as “settled law,” it examines it carefully in the course of distinguishing between positive health and wellness, i.e. the absence of disease. This distinction entails methodological structuralism with the community as the locus of causality. And that assumption requires causal claims that begin with distal variables, such as economic decline and unemployment, and moves on to social rather than physiological intervening mechanisms. In that form, it raises fundamental issues. But no matter how these issues are settled, the conventional question has been reversed. Now we are trying to explain the improvement in health, not the prevalence of disease.

Getting to that point requires some ground-clearing. That task is undertaken in Chapters 1 through 4, which deal with the “social determinants project” that currently defines social epidemiology. The social determinants research program finds that education, high income, being married, having friends and the like reinforces host resistance and lengthens life. The research that supports this expansion of the classical model was and continues to be ground-breaking. But its interpretations of the facts can be challenged. The pivotal move that leads to an alternative theory is to start with communities instead of individuals. Health in the sense of the absence of disease is certainly an attribute of the individual body,

and it is reasonable to seek the causes of illness in the interplay of pathogens and physiology. But that core process of the biomedical explanation does not explain how social factors can affect health directly.

Chapters 5 through 8 lay out the alternative structural theory as applied to communities and to the individual as a special case. Chapter 6 pays special attention to pluralism and solidarity, which, with the more familiar structural differentiation (the division of labor), constitute the master adaptive strategies that all communities use to reinforce their special purpose organizations like clinics and public health departments. Chapter 7 focuses on the differential responses to threat that strong and weak communities make and compresses the relevant variables into a “capacity/threat ratio.” Chapter 8 continues the exposition of the theory by focusing on the “deviant” responses—crime, delinquency, retreatism, family disorganization and the like—that weak communities foster in their trial-and-error attempts to deal with existential threats. These responses tend to amplify the threat and reduce the health of the whole community. What starts as the desperate reactions of families and individuals to community disruption ends as biological deficit. Social problems become public health problems.

The last chapter explores this theoretical finding by posing the possibility of a “social problems public health.” How would it differ from established public health? What interventions would it recommend? Indeed, what interventions are even possible when the cause is a threat like the decline of manufacturing? This dilemma of macro causation versus proximate remedies is reminiscent of the impasse that Durkheim faced in the last chapter of his study of suicide. He made the case for the social causation of suicide rates but was unable to come up with a feasible approach to prevention. Indeed, many of the countries with high suicide rates that he studied still have high rates. But at least we know that the causes are social.

Acknowledgements: For the most part, this book grew out of the empirical research that I have been doing over the last decade. But along the way my colleagues Joe Francis, Douglas Gurak and Tom Lyson were always available to help me understand findings and methods that outran my knowledge. Mary Jordon and Linda Warner managed the many drafts of the manuscript and my wife Lorrie made it all possible, once again.

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CHAPTER 1 *A NEW PERSPECTIVE ON HEALTH*

Using the word “new” in a book on health runs the risk of adding to the cacophony that crowds the air waves in contemporary society. It seems as if everyone is looking for some way to improve his or her health and is eager to try out just about anything “new.” This same frenzy has penetrated the public health publications and is creeping into scholarly articles. Geneticists and their publicists are especially prone to the “product differentiation” urge. Probably there is no stopping this tendency because progress in science is supposed to add to our knowledge. That is the name of the game and even a minor technology may be new in a narrow context. So the question is: In the broad field of health theory and prevention, what could possibly qualify as new? This chapter begins to answer that question with the claim that there is more to health than the absence of disease. Moreover, a positive state of biological functioning cannot be explained by the dominant biomedical theory.

IF WE HAVE QUALITY AUTOMOBILES, WHY NOT QUALITY BODIES?

In a recent monograph on our “aging world,” Kinsella and Velkoff (2001) list the achieved life expectancies for 16 developed and 18 less developed countries for which figures were available for 1900, 1950 and 2000. Female life expectancy in Japan is highest, having risen to 84.1 years by 2000, but just as remarkable is the U.S. rate of 79.9 despite its lagging black population. Furthermore, 11 of the remaining 14 countries have attained 80 or more years. The lowest is Hungary with a female life expectancy of 76.1. Among the less developed countries, South Korea, Argentina, Costa Rica and Chile show female life expectancies of 78 or higher. From these figures, it appears that we have already learned how to produce healthy bodies.

The provincial figures for certain countries are equally remarkable. Spain, for example, reports a 1990 mean of 80.6 for female life expectancy, ranging from 78.7 to 83.6. (*Anuario Estadístico de España*, 2000). The women in this cohort lived through the Spanish Civil War and the poverty that followed. Their shorter stature reflects this experience, but despite such hardships, they have lived long lives. In Japanese prefectures, the life expectancy of women who lived through the post-war rural-urban transition after 1950 shows a narrow range, similar to that in Spain.

This book outlines a sociological explanation for what may be called the rise of positive population health. It focuses on vitality, abundant energy and mental alertness, which is separate from the illness-wellness dimension. The relationship of the two explanations, biomedical and sociological, is not unlike that for the appearance in the U.S. of the quality automobile. Determined to compete in the global market after their defeat in World War II, the Japanese embarked on a program of economic nationalism. The quality cars they produced appealed especially to a rising population segment of professionals in the U.S. who valued machines that did not need frequent repairs. Of course, the new cars did break down occasionally, in which case the repairmen, now skilled in electronic diagnosis and the replacement

of computerized components, applied their practical and theoretical knowledge of gasoline engines to cure the malady. They were the new gas engine doctors. But their efficient repair work was not the cause of the quality car. That happened in a particular kind of society as it embraced a democratic but disciplined organization of production, an approach that has now diffused to almost all countries that manufacture automobiles. Thus, the explanation of the birth of the quality car is fundamentally sociological. Following this analogy, we can be sure that the explanation of positive health, in contrast to the elimination of disease, will also be sociological.

THE POPULATION HEALTH CRITERION

“Population health,” a term introduced by Evans, Barer and Marmor (1994), is the rate of an appropriate measure of health across comparable communities. The life expectancy of people living in rich or poor countries is probably the best example, and it reminds us that rates for communities have existed for as long as governments have been keeping records. In view of that, a claim that population health is an idea whose time has come may sound ill-informed. And yet it conveys a new appreciation of the importance of community-wide indicators, complementing the more conventional clinical judgments.

This book follows Selznick’s (1996) definition of communities as multipurpose groups that are concerned with the general welfare of their members. By this definition, groups as small as the household and as large as the nation-state are communities, although the two ends of the continuum are often treated separately. That still leaves a wide range, from neighborhoods to villages, townships, counties, provinces and regions. The working assumption, subject to test, is that communities are usually stronger influences than specialized groups like churches or friendship groups. Only ethnic groups affect their members as powerfully, at least in part because they too function as multipurpose groups.

In the last several decades, a consensus seems to have crystallized on the value of a long, disability-free life. It is a “final good” that is valuable in itself and therefore more fundamental than criteria like wealth and power. As such, it can serve as a standard for a wide range of theories. The comparisons of the life expectancy of countries in World Bank and U.N. publications over the last several decades have contributed to the recognition that population health can be positively defined. Stimulated by criticisms that there is more to development than GNP, these organizations standardized a number of population health measures and began to view them as indicators of “human capital.” In the course of this exercise, it became clear that positive indicators could be listed without reference to disease rates. That fact helped to institutionalize the contrast between the two types of health that is central to this book.

Ever since the World Health Organization (1984) proposed its much-maligned definition of health as “a state of complete physical, mental and social well-being...,” the idea of positive health has been spreading (Breslow, 2000: 39). Both the Jamner and Stokols (2000) and the Brim, Ryff and Kessler (2004) essay collections emphasize the distinction between positive health and freedom from disease, and explore its radical implications for research and practice. Tarlov (1996:72) has made the

distinction explicit: “Health is the capacity, relative to potential and aspirations, for living fully in the social environment,” while the comprehensive review by Ryff and Singer (1998) derived a conception of positive health from philosophical sources.

The downgrading of the disease concept of health began when Rose (1985; 1992) noted that until quite recently clinicians classified people into those who manifested a particular disease and those who did not. That identification typically set the stage for treatment. But improved understanding of diseases forced the view that disease symptoms were typically distributed in the shape of the familiar bell curve. The “sick person” was simply the one whose symptoms deviated from the mean. The classic illustration of this reorientation is hypertension where the symptom can only be known by measurement and the cutting points that define hypertension, although guided by research, are fundamentally arbitrary.

Whatever the cutting point that defines a particular disease, “wellness” is what is left. That leaves the definition without content, which is not satisfactory. Of course, freedom from disease is a pressing concern for sick people, and if they are cured, they are usually thankful for their residual status. But the time has come to pay attention to positive population health. It may not be central to clinical practice, but it is clearly important to public health.

If the two types of health are independent of each other, then positive health can occur with illness, and wellness can coexist with low vitality. We can think of a cross-classification that generates these two combinations as well as the minus-minus and plus-plus cells, but such a typology may not do justice to the facts. Illness typically affects vigor, while positive health may protect against disease. So empirical studies are needed. This book will assume that future research will show that the two concepts are empirically distinct and that any empirical association is weak and variable. Newly developed measures of “disease and disability-free years” should make the relationship more precise.

Population health must be studied comparatively and quantitatively, in contrast to the typical practice among clinicians who work up a case study on individual patients. For them, health is a feature of personal biography, especially a person’s history of illnesses. Although clinicians may assess their patients against population norms, they mostly work with what they have: an individual with a unique biological history. They usually feel no need to inquire into the characteristics of the communities in which the patient lives or the indicators of positive health in their life history.

Population health rates refer to all the people in a community. Usually this means all the people who live within the boundaries of a certain type of named place. Getting these boundaries right is sometimes difficult, but the task is important if the researcher hopes to make accurate comparisons. Given such measurements, experience confirms that health rates vary across communities (of the same type and scale), and for a given community they may remain stable over decades.

MEASURING POPULATION HEALTH

Although the introduction of the term “population health” has expanded thinking among epidemiologists, it has also contributed to confusion because the term is used for different research operations. Table 1.1 organizes these by means

of a typology that cross-classifies the disease/vitality observations with the type of measurement.

Table 1.1 Basic types of health measures

Observation	Disease symptoms	Vitality attributes
Clinical examination of a single person	Clinical assessment	Informal assessment
Sample of individuals in a single community	Disease rates for individuals	Vitality rates for individuals
Surveys of individuals in comparable communities	Community rates	Community rates

The typology contrasts the two types of outcomes, both of which form continuous variables: degree of illness and level of vitality. At present, the accepted meaning of “healthy” in the clinical context is a disease-free person, but physicians often make informal judgments about the vitality of the patient and they may use simple devices for measuring respiration or stamina. It may be that self-reported health based on the standard “How would you rate your health?” question is a valid measure of vitality, especially when any known diseases are controlled for in the course of analyzing samples.

The vertical dimension in the typology moves from the individual in a clinical context to the samples that epidemiologists draw and then to the community-bounded surveys, which take two forms depending on whether whole communities are compared. It is this third type of comparison that the term “population health” applies to because it is explicit in comparing communities. These must be further specified with respect to level (neighborhood, county, province, nation) to insure comparability.

In the present state of measurement, mortality rates may be used both for “all-cause” rates and for vitality. “All-cause” refers to diseases and similar conditions, not to all the other causes of mortality that interest sociologists. Moreover, mortality does not capture the full meaning of vitality, which is better measured by disability-free life expectancy. It does, however, reflect the molar character of vitality that is fundamental to the population health concept as used here. Many countries are creating datasets for age-adjusted mortality, life expectancy, infant mortality, disability-free years of life and similar measures for cities and counties, which are currently the important communities for the study of population health within a given country. In the U.S., the CDC Wonder website contains age-adjusted and race-specific mortality rates.

Depending on the level of community under study, population health measures take different forms, varying from self-reported categories to life expectancy. For the former, we can draw a distinction between self-reports that may be used without further bureaucratic processing and those, like a person’s answers to the four census questions concerning disabilities, that are published only as aggregates for a particular level of community. Although all self-reports start with individual responses, converting them to rates transforms them.

The best known self-report question is simply: Would you say that in general your health is excellent, very good, good, fair, or poor? Idler and Benyamini (1997) have reviewed 27 studies that asked this question and found “impressively consistent” evidence of the power of self-reports to predict death. They suggest several lines of explanation: self-rating is more sensitive and inclusive; it is a dynamic evaluation of the trajectory of health up to that point; it may influence behaviors that affect health; and it implies resources that may forestall death. Whatever the reason(s), it is a valuable tool for health research.

The Centers for Disease Control and Prevention (2000) use the self-rating along with three other questions about the number of days in the last month that the respondent’s physical and (separately) mental health was not good and the number of days that poor health interfered with “usual activities.” This four-item measure is now included in many state-level surveys.

Kindig (1997:60ff) has reviewed a number of these composite measures and concludes that the “years of healthy life” measure that Erickson and colleagues (1995; see also Kaplan, 2000) have proposed is the best so far. These researchers looked at the 30 combinations generated by two National Health Interview survey questions. The questions refer to disability limitations of activity and the respondent’s general perception of health. The combinations were scored from 1 (no limitation/excellent self-reported health) to 10 and multiplied by years of life remaining for separate age categories. In the example that Kindig presents (1997:66), the adjustment for disability reduced the total life years by 27 percent, a figure that will fluctuate across communities.

More recently the World Health Organization has published the results of its “healthy life expectancy” project that refines life expectancy estimates by subtracting the estimated years of ill-health of varying degrees of severity (WHO 2000). These estimates reduce the life expectancies of all countries, some more than others. Japan scores highest, followed by Australia, France, Sweden and countries around the Mediterranean. The U.S. ranks 24th with a score of 70.0 disability-free years. That score compares to Japan’s 74.5 and Switzerland’s (ranked 8th) 72.5, suggesting that western countries are bunched up at the top. This new measure will certainly be improved in the future, but it points the way for taking illness into account while producing an estimate of positive health. It does not correct for the fact that the largest gains in life expectancy, especially in poor countries, are concentrated in the first year of life. That bias in comparisons of countries must be corrected in other ways, such as using life expectancy after one year of life.

Why not determine the gain in life expectancy that results from finding a cure for each disease and add up the total years? This approach seems to be behind the subsidies that most governments make to the cost of research on particular diseases, and it justifies the frequent use of disease-specific death rates as measures of population health. According to Keyfitz’s (1977) analysis, however, cumulative disease rates give misleading estimates. While it is true that a cure for cancer, for example, would increase life expectancy by the percentage of deaths attributed to cancer, over the long run the gain would be small. The reason is that gains from the elimination of diseases are not additive. The people who continue to live because their cancer has been cured must face the prospect of dying from another disease. If the second disease strikes within a few years, there would be little cumulative gain.

The production and publication of disease rates is valuable and should continue. But positive health is also increasingly important, and researchers should intensify the search for the best measures. (See Gold, Stevenson and Fryback, 2002, for a recent review.) It is a truism that the availability of a good measure stimulates research. That is already apparent in the increasing use of life expectancy for comparing larger communities. These comparisons, in turn, have dramatized the idea of positive population health.

THE MOST SIGNIFICANT HEALTH EVENT IN HUMAN HISTORY

Of the many remarkable examples of population health change in the post-World War II era, surely the most amazing is the increase in life expectancy for the less developed countries of the world. It almost doubled from its 1950 level of approximately 35 to 62 in 1987. In the words of the authors of the first Human Development Report (UNDP, 1990:2), “Never before have so many people seen such significant improvement in their lives.” By contrast, England took about 100 years to attain a life expectancy of 69 years by 1950 (Stekel and Floud, 1997:424).

Table 1.2 presents a more detailed picture. It is apparent that the largest increase occurred in the non-African developing countries between 1960 and 1995. Despite its many handicaps, sub-Saharan Africa increased its life expectancy by 12 years. The industrial countries added five years to the average life span despite their initial high level and the possibility of a ceiling, especially for infant mortality.

Table 1.2 Average life expectancy by types of countries, 1960-1995.

Year	Sub-Saharan Africa	Other developing countries	Industrial countries
1960	40	48	69
1975	46	51	71
1987	51	56	74
1995	52	63	74

Source: UNDP, Human Development Report, 1990, 1995, 1998

It is true of course that a large part of the improvement in life expectancy is due to the reduction of infant mortality. But Sagan (1987:18) argues, using data from a large insurance company, that people in the U.S. over 85 have benefited as much as the young. (See also Beaglehole and Bonita, 1997; Riley, 2001:3; Zopf, 1992:233 and comparable figures in Winter, 1982:103). These increases in the life expectancy of adults are remarkable, particularly because they show benefits for the very old. This fact bears on the thesis of this book because it highlights the role of medical technology and related medical organization as part of the social causation of adult health. The structural theory proposed in the following chapters makes technology an auxiliary variable that varies with the changing environment. Much of the medical technology developed since the industrial revolution has targeted infectious diseases, but intensive work has shifted to the chronic diseases where the social environment is a major factor.

A related question is whether the increase in life expectancy has been achieved at the cost of more chronic illness. That is hard to credit because such illnesses weaken

the body and cause earlier deaths. Or, to turn the argument around, whatever accounts for longevity should also reduce morbidity. However, as soon as medical technology is taken into consideration, the relation between expected longevity and morbidity changes, and the correlation could become positive.

England and Wales (but not Scotland) experienced the earliest significant decline in mortality, and British researchers have pioneered research on this topic, improving their record-keeping, their statistical techniques, and explanations. The central fact of the British experience (Winter 1982:100) is that “the decline of mortality in Britain in the period 1870-1950 was on a scale both unprecedented and dramatic. In roughly three generations, crude death rates...were halved, infant mortality rates were reduced by 80 percent, and mortality at all ages due to infectious diseases was reduced by approximately 90 percent.” Life expectancy increased for men from 40.5 years in 1861 to 68.2 years in 1960. Women did even better.

Interestingly, mortality decline occurred throughout Europe during this period. Within Great Britain, the mortality decline had the comparable effect of reducing the variation among subnational regions. But some differences increased. In 1901 the difference between male and female life expectancy was four years, but by 1960 it was six years. With respect to class disparities, the infant mortality rate of the lower stratum was 41 percent higher than that of the upper stratum in 1911. But in 1939 the gap had increased to 59.3 percent (p. 107). Many other regularities have been noted, especially with respect to the diseases associated with death, but even these are enough to make the point that an adequate explanation of these trends must now cover many new facts.

The rise in life expectancy in the United States roughly parallels that of the United Kingdom. Table 1.3 presents the basic facts, disaggregating life expectancy by sex and race. Overall, the gap between the life expectancy for the sexes increased, while that for race decreased. For both races, the female life expectancy in 1900 was approximately 3 years greater than that for males, and it increased to 7 years for white women and 8 years for black women. The gap between black and white males in 1900 was approximately 16 years but it decreased to about 7 years by 1988. The gap favoring white women decreased to about 5 years.

In his commentary on this and related graphs, Zopf (1992:230 ff.) notes the marked fluctuations from year to year until about 1945, after which the curve smoothes out.

Table 1.3 Life expectancy in the U.S. for selected periods, 1900-1988

Year	White		Black	
	Male	Female	Male	Female
1900-02	48.2	51.1	32.5	35.0
1986-88	72.2	78.9	65.1	73.5

Source: Adapted from Zopf (1992:232)

He attributes this smoothing to the increased control over diseases, especially the introduction of antibiotics after World War II. But it is hard to see how this type of “death control” could account for the sharp rise of life expectancy after a leveling off period that ended in 1970. Neither would it account for the widening

gap between the life expectancy of the sexes after 1945. The gap between the races, which also showed a more pronounced decrease after World War II, would support the medical technology hypothesis only if an auxiliary hypothesis were introduced to account for the gender gap.

Further discussion of causes takes us beyond the purview of this chapter, but these examples illustrate a point that grows in importance throughout the book: population health differentials stimulate the search for social causes without reference to the physiological processes that the biomedical model of health requires. Perhaps the biomedical researchers have simply accepted the model and assume that further research, with different instruments, will explicate the causal chain. Alternatively, they accept social causation and believe that someone else will formulate an alternative causal sequence that bypasses physiology, including the immune system. If so, their faith in the scientific community's capacity for radical innovation is stronger than might be expected, given the dominance of biomedical model. Nonetheless, the central aim of this book is precisely that, to formulate an alternative explanation of (population) health, one that will probably restrict the scope of the classical model.

POPULATION HEALTH AS A UNIVERSAL YARDSTICK

Social epidemiologists frequently invoke Emile Durkheim's (1951/1897) classic study of suicide in nineteenth-century European countries because he is credited with formulating a sociological framework for linking characteristics of large communities—mostly provinces and countries—to suicide rates, and, by extension, to other causes of death. Like homicide, suicide has a conscious element that appears to set it apart from the many disease categories that appear in the vital statistics. But Durkheim considered intentions irrelevant to causal explanation and would not have made that distinction. Indeed, the official classifications of the causes of death used in most countries of the world implicitly follow this judgment in listing suicide as a cause of death, without comment, along with the many diseases.

The contrast that Durkheim did draw is that between a rate and the individual act: "If, instead of seeing (them) as separate occurrences, unrelated and to be separately studied, the suicides committed in a given society during a given period of time are taken as a whole, it appears that this total is...itself a new fact sui generis, with its own unity, individuality and consequently its own nature—a nature, furthermore, dominantly social" (1951:46). In other words, suicide rates are emergent properties.

In his provocative book *Unhealthy Societies* (1996), Wilkinson comments that "if Durkheim had been writing now, it seems likely that in the context of the modern burden of disease in developed societies, he would not have confined his analysis to suicide" (1996: 15). Well, maybe, but there is still plenty of suicide in modern society and that one rate was enough to make the case for sociology, which was Durkheim's aim.

With that historical preface, the case for population health as a universal yardstick may be made as follows. Population health is a final good. Unlike money and power which are instrumental for achieving other goods—such as better health—it is an end in itself. It is the ultimate value for individuals and increasingly

for communities as large as the nation-state. Among other benefits, it cuts costs in the global economic competition and it reduces the burdens of government that are threatened with bureaucratic overload.

Population health is an attribute of all community levels, from the household up to the state and for every level in between. It can be measured in a variety of unbiased ways that mean the same thing anywhere in the world. National governments have accepted the task of monitoring population health just as they did earlier for wealth and income, industrial production and demographics. But this measure differs from all the others in pinpointing the biological quality of populations.

Population health is an emergent property—not simply the aggregation of bodies that are functioning well. As an emergent property, it can be understood as a special component of community structure, one that is singled out as a criterion for the performance of the community as a whole. It invites researchers to conceptualize community structure in such a way as to predict population health as precisely as possible. Just as an individual with a particular style of life tends to have a stable body mass index, communities of different types have distinctive levels of population health until such time as their structure shifts. This postulate of structure/health unity sets the stage for research on the mechanisms that maintain the tight interconnection. More than that, it directs our attention to the causes of structural shifts.

The close association of structure and population health trends is illustrated by Figure 1.1, which displays the life expectancy for four European countries. The trends for Belarus and Russia show a decrease from about 1965-1970, in contrast to Spain, where the trend is steadily upward. The trend line for Poland shows a 25-year plateau, after which it rises as steeply as that of Spain. The decline for Russia and Belarus is preceded by a sharp rise about 1985-90, after the fall of the Berlin wall. There appears to have been a moment of hope that worked to increase life expectancy. Then both trend lines decline. All told, the graph lines show two “successful” countries and two that are not successful. The latter pair were more completely committed to the command economy and have been “hurt” more by the transition from socialism to market capitalism.

We may infer from these trend lines that life expectancy reflects the structure of unitary communities. The lines do not fluctuate as much as they would if they referred to purely individual characteristics. The reason for this stability is the same that Durkheim gave for suicide: they reflect social structure. He might have added that many other social indicators—accidents, divorces, disease rates, body mass, money saving and the like also reflect social structure. By contrast, some diseases are caused by viruses that are independent of structure, in which case the graph line would fluctuate according to the spread of an asocial pathogen.

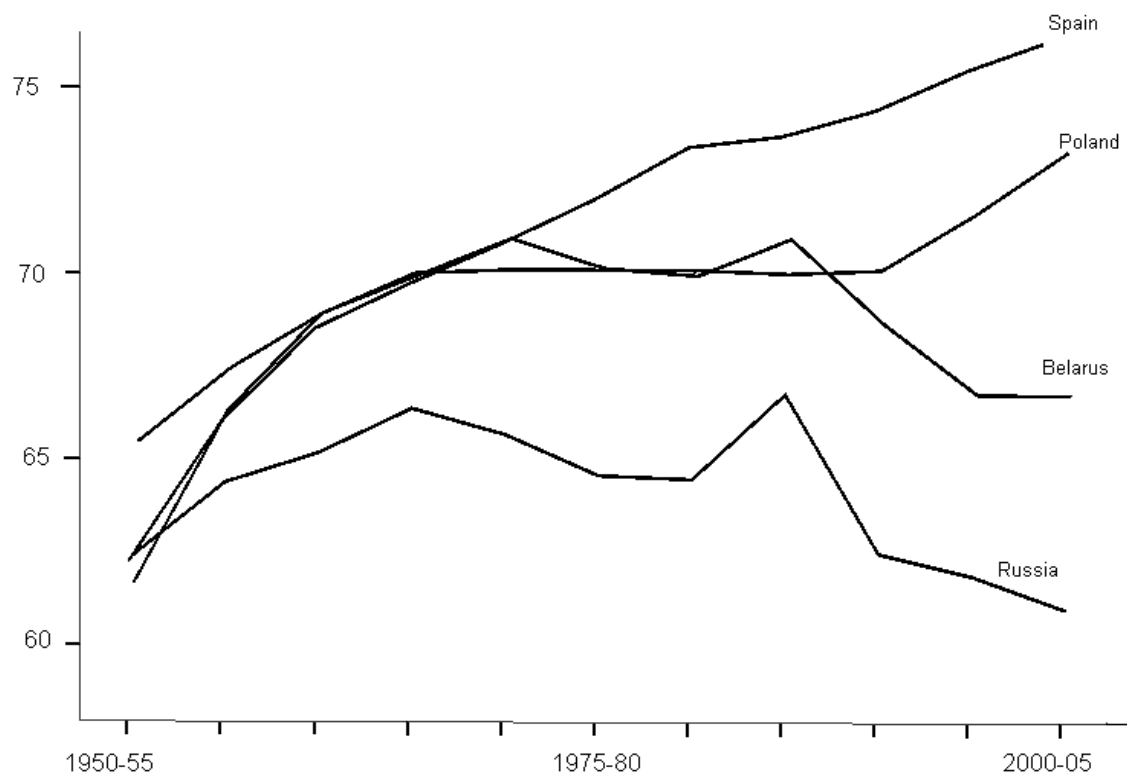


Figure 1.1 Trends in life expectancy (male) for two types European countries, 1950-2000

It follows from the structure/health postulate that if successful, the study of population health will lead to more effective prevention. If the health of a whole community can be changed by shifting the structural profile of the community, then we are encouraged to look for the same kinds of collective interventions that biomedical public health has already devised. But now, in addition to smog reduction, purification and fluoridation of water, food fortification, and the like, we can look for ways to integrate minorities into the mainstream, cushion the shock of mass unemployment and direct the energies of gang members to less dangerous directions. Such interventions are not easily accomplished but that is the direction that research based on the population health criterion should take us.

CHAPTER 2 THE BIOMEDICAL EXPLANATION OF DISEASE AND WELLNESS

How can we explain population health differentials? The accepted answer is that people in some communities are beset by mostly invisible threats such as germs, malnutrition or toxic wastes, and, depending on their resistance, they die at higher rates. They may also lack preventive medical facilities. The biomedical explanation identifies the human body as the locus of both cause (the immune system defending against germs) and effect (disease free bodies), and it squares with the commonsense view that explaining biological processes like sickness and death requires the investigation of biological causes, both within and outside the body.

A CODIFICATION OF THE BIOMEDICAL MODEL

It is puzzling that the underlying theory that guides research and practice in epidemiology has nowhere been fully articulated or critically examined. One has to piece the model together from statements such as those in Dubos (1959), Pearlin and Schooler (1978), Williams (1990) and Kaplan (2000) and Berkman, Glass, Brissette and Seeman (2000), among others. The model that guided the formulation used here was adapted from that of Mosley and Chen (1984).

Table 2.1 summarizes the fundamental features of the biomedical model that explains health as the organism's strength in a constantly changing but potentially noxious biological environment. The organism is endowed with genetically determined defenses, but host resistance can be strengthened by social reinforcement. The theory assigns a special role to medical interventions, including public health technology and lifestyle recommendations.

Table 2.1 Diagram of the biomedical model of health showing causal sequence and the core mechanisms

Distal or indirect determinants	Proximate determinants	Outcome
Genetic and biological	Resistance: biological and acquired	Minimization of environmental threats and freedom from disease
Socioeconomic status, formal participation, informal affiliations, marriage, work, etc.	(R/T ratio)	
Medical technology and "lifestyle" campaigns	Threats: microbes, stress, contamination, injury, malnutrition	

The first column in Table 2.1 lists distal or indirect determinants. Genetic determinants are noted simply to complete the list. This book will not discuss them to any extent because until more research accumulates, it is reasonable to assume that genetic factors are random across populations, especially in heterogeneous

populations like the U.S. (Strohman, 2000). Small isolated and/or ethnic communities may have concentrations of a particular gene, but it is unlikely that such a cause would affect the population health rates across communities.

Socioeconomic status and similar social determinants are the variables that are prominent in the “social epidemiology” paradigm that University of California researchers initiated about 1960. The structural model proposed in this book departs from this one, but it could not have been formulated without it.

Medical interventions and “lifestyle” campaigns are shown separately because they reflect organization that is dedicated to defending against environmental threats. This description applies especially to public health organization, such as sewerage disposal and delivery of pure water, but it is widely believed that curative medicine also contributes to higher levels of health by the cumulative impact of recovered patients. The medical intervention category includes the “lifestyle” recommendations such as moderate eating, exercise, safe sex, and avoiding contaminants like smoke. Some of these recommendations are little more than folk wisdom, but in recent years medical science has produced evidence of their health impact.

The central process of the biomedical theory is shown in the middle column of Table 2.1, where both sides of the balance, resistance and threats, are referred to as “proximate determinants.” The host resistance side has a genetic component as well as enhanced resistance based on the social determinants. The proximate threats consist of disease pathogens, injury, malnutrition and the like. The two categories are usually seen as the terms of a “resistance/threat ratio.” The aim of medical science is to find ways of maintaining a positive R/T ratio.

The proximate determinants are fundamentally (micro) biological, but they connect the outside world with the body’s physiology. Our understanding of the “outside” has been expanded in recent decades to include social determinants and that is a major achievement. But it is also a major challenge because the “sociobiological translation” (Tarlov, 1996) process must be explicated. The working hypothesis is that social determinants articulate with and strengthen the resistance side of the ratio, while medical technology works to neutralize environmental threats. (See Berkman and Syme, 1979, House, Landis and Umberson, 1988, and Seeman, 1996). The transition from social determinants to biological processes occurs at this juncture, between the first and second columns. The social variables are “effect modifiers” because the model designates the Resistance/Threat ratio as the true cause of disease-free outcomes. However, they leave open the alternative formulation that the social determinants are more “fundamental.” This position has been argued by Link and Phelan (1995) and appeals to many sociologists. But it has not (yet) dislodged the classical model.

Stress is included in the list of proximate determinants because ever since Selye’s (1965) description of the physiology of the stress reaction, “stress” and “stressors” have been accepted as a cause of ill-health. Selye situated the stress reaction in an evolutionary framework, as the physiological concomitant of the fight-flight reaction that all animals depend on for survival. He described a sequence of alarm, resistance/evasion and exhaustion that psychologists quickly generalized to humans by calling attention to their greater repertoire of responses and, also, the possibility of a persistent threat that left a person exhausted and physically impaired. It seemed

obvious to many that the varied and continuing threats of industrial society could overwhelm a biological response designed for primitive emergencies.

Where do diseases fit in this model? The principal source for this diagram is the Mosley and Chen (1984) codification which interposes a healthy/sick variable between the proximate determinants and mortality. Link and Phelan (1995) do the same and go on to use the fact of changing disease rates (along with shifting strength of the proximate determinants over time) to argue the secondary role of these intervening processes as compared to the “fundamental” social causes that maintain their predictive force despite proximate determinant changes.

The health “outcome” in the third column is somewhat vague in the biomedical model. Advocates generally refer to “health” or “health status,” but all that the theory actually explains—although that is quite a lot—is a pathogen-free organism. Most biomedical advocates believe that health is more than that, but they are not explicit about the process by which absence of disease becomes a positive state. Is an insult-free organism healthy by default? Given the current shift in opinion from health as “disease-free” to a more positive concept, this feature of the biomedical model is beginning to look like a deficiency.

In Figure 2.1 causality moves from the distal to the proximate determinants and thence to health status. For example, higher income helps people to acquire better food and protected environments. It also contributes to superior host resistance in the form of more stable marriages, quality childcare, instruction in managing the body, and the like. Higher income helps in acquiring quality medical care, while education improves the choices involved in these acquisitions. In all these examples, causality is transmitted through an interaction term. The social determinants mainly affect the numerator of the R/T ratio which, if the threats are not too strong, allows the body to repel the biological attack.

THE DISCOVERY OF SOCIAL DETERMINANTS

Since about 1970, a new line of research on the health effects of “social determinants” has decisively expanded the biomedical model. Of course, the role of a social variable like socioeconomic status has been known in a general way for centuries (Antonovsky, 1967), but recent research has introduced systematic measurement and sharpened our understanding of that relationship. In addition to SES there are numerous statuses, types of social participation, work and community contexts that are associated with health. What is remarkable about this group of determinants is that they have been “discovered” only recently. Stimulated by the seminal articles of Cassel (1976) and Cobb (1976) and empirically realized by Berkman and Syme (1979), these researchers have produced an impressive set of well-designed researches and a wealth of supporting commentary.

The addition of the social determinants to the classic biomedical model is the basis of the new field of “social epidemiology” (Kawachi, 2002). It has also led to a deeper appreciation of the original explanatory format. Examples of this synthesis are diagrammed in Brunner and Marmot (1999) and in Berkman, Glass, Brissette and Seeman (2000). The social determinants program represents a major advance in epidemiological thinking. Within the framework of the expanded biosocial explanation, there are five broad categories of social determinants that have been

interpreted as social causes (George, 1996). These are socioeconomic status, “integrative” statuses like marriage or employment, informal affiliations, formal participation and “community contexts.” These categories organize the many variables that provide the illustrations for the rest of the chapter. Even as a set of categories, though, they present problems. The warning quotes around “integrative” reminds us that not all statuses are integrative. Being married, for example, may have a negative impact on health for some people, such as wives who care for disabled husbands or who are subject to abuse.

The contrast of informal and formal social relations is highlighted here because later chapters will show that they are empirically distinct and predict health differently. Having friends is not equivalent to being a member of a club or attending church, despite their frequent inclusion in a single index of “social support.” Likewise, “community contexts” (also “collective” variables, as in Singer and Ryff, 2001, 91ff) are different from all the others because they refer to community-wide variables such as “social cohesion” or organizational complexity. These are attributes of the group as a whole and cannot be derived from the aggregated individual behaviors that are frequently used in community comparisons.

Although all five types of social determinants occur in communities, they refer to different community levels. Marriage obviously pertains to the family, but the referent of socioeconomic status, which is typically measured by the education and/or income of husband and wife, can be either the family or the individual. Formal participation usually refers to community-based clubs and associations, but national associations are increasingly frequent despite the lack of face-to-face contact. These and other questions that bear on the locus of causality will be taken up later.

Medical services are social, but they are not considered social determinants for a number of reasons. They are science-based and therefore not “naturally” social in the same way as socioeconomic status and the other factors are. Also, they are often applied after the damage is done, so to speak. Whether or not curative medical care strengthens host resistance for the next encounter with the environment is difficult to say. A clearer case can be made for public health technology and related clinical interventions (i.e. screening and immunization).

IDENTIFYING RISK FACTORS

The biomedical model provides a general orientation for the selection and interpretation of the variety of social determinants and risk factors, and much can be learned by an analysis of the kinds of variables social epidemiologists work with. The data source for this analysis is the National Health and Nutrition Examination Survey (NHANES III, U.S. Department of Health and Human Services, 1997), a well-known national survey that contains two global measures of health status, a self-rating and a doctor’s assessment. The dataset used here included approximately 18,000 respondents. (See Ferraro and Farmer, 1999, and Burt, Whelton, Roccella et al., 1995, for detailed accounts.)

Table 2.2 presents the descriptive statistics for the 27 measures that constitute the input for a factor analysis (a data-reduction technique), not shown, that further reduces the list. These variables are mostly taken directly from the responses to the NHANES questions, but some indexes, like chronic conditions, are counts of

conditions listed in the questionnaire. Others, such as the percent of dietary fiber, were calculated by professionals on the NHANES staff from the 24-hour food recall. Still others, such as blood pressure, were part of the clinical examination

Table 2.2 Descriptive statistics for variables

Variable	Mean	Std Dev	Minimum	Maximum
EDUCATION	12.3	3.16	0.00	17
INCOME	6.6	3.30	0.00	11
OCCUPATION	1.8	0.81	1.00	3
TEETH	3.7	1.41	1.00	6
CLUBS	0.38	0.48	1.0	1
TRAINING	1.9	1.6	0.00	8
CHRONIC	0.65	1.0	0.00	7
MEDICATION	0.44	0.50	0.00	1
DISABILITIES	0.09	0.43	0.00	8
DIASTOLIC	73.7	10.2	20.0	142
SYSTOLIC	121.8	17.7	69.0	244
BMI	26.3	5.7	11.7	79
CANDY	4.6	8.8	0.00	182
PASTRIES	11.00	13.02	0.00	200
SALTED	8.4	10.78	0.00	200
FMFRYR	117.3	115.59	0.00	365
NEIGHBORS	61.3	109.04	0.00	365
FMFRPH	10.8	15.86	0.00	365
MARRIED	59%	0.49	0.0	1
FAMILIES	3.0	1.7	1.0	10
EVERSMOKE	0.53	0.5	0.00	1
ALCOHOL	1.91	6.57	0.00	90
CHURCH	30.8	49.25	0.00	365
WALKMILE	6.2	11.8	0.00	100
PFIBER	16.6	10.2	0.00	65
OWNBOSS	0.08	0.27	0.00	1
GOVWORK	0.10	0.30	0.00	1

These are weighted estimates using weights (wtpfex6) suggested in the NHANES documentation. The regressions in subsequent tables are not weighted.

VARIABLE DEFINITIONS:

EDUCATION=number of completed years of schooling, 0 to 17 years.

INCOME=family income category when compressed to 11 categories, beginning with 0 income and increasing by \$5000 intervals to \$50,000+. The mean of 6.6 corresponds to \$27,000.

OCCUPATION=1, blue-collar categories 17-40 (private household occupations to equipment

cleaners and handlers); 2, clerical and sales categories 05-10; 3, managers and professionals 01-04.

TEETH=professional's rating 1-6 (excellent).

CLUBS=1 if respondent was a member of any "club" during the previous year.

TRAINING=sum of 1's for any of the following activities in last month: jogging/running, bicycling, swimming, aerobics, dancing, calisthenics, gardening, lifting weights or sports. Percent reporting one or more activity=68.7%.

CHRONIC=sum of heart+arthritis+high blood pressure+cancer+cataracts+hayfever+emphysema+bronchitis+asthma+stroke. Percent 1+ is 51.7.

MEDICATION=1 if respondent has taken any prescribed medicines in the last month.

DISABILITIES=1 if respondent was observed in bed, or in wheelchair, crutches, shuffling, with hands or legs paralyzed, hearing impaired, speech impaired or with persistent cough.

DIASTOLIC BLOOD PRESSURE=average of three measurements.

SYSTOLIC BLOOD PRESSURE=average of three measurements.

BMI=body mass index, wt (kg)/ht (m)² as calculated by NHANES.

CANDY=times per month ate candy or chocolate.

PASTRIES=times per month ate cakes, cookies, brownies, pies, doughnuts or pastries.

SALTED=times per month ate salted snacks such as potato chips, taco chips, pretzels or popcorn.

FMFRYR family and friend contacts: how often per year get together with. Truncated at 365. These arbitrary reductions of improbable maximums in this and the following items render the means untrustworthy.

NEIGHYR=neighbors, how often per year visit with neighbors. Truncated at 365.

FMFRPH family and friend telephone contacts: number of times per week on the telephone with family and friends. Truncated at 100.

MARRIED=1 if married or permanently living together.

FAMSIZE=family size, a simple count of family members.

EVERSMOKED=1 if smoked 100 cigarettes or more in lifetime

ALCOHOL=alcohol consumption=times per month drank hard liquor. Truncated at 90.

CHURCH=church attendance: number of times attended church during the previous year. Truncated at 365 days.

WALKMILE=times during last month walked a mile or more.

PFIBER=percent fiber (grams) consumption per day, as calculated by NHANES. Truncated at 65.5.

OWNBOSS=1 if self employed versus "private company work".

GOVWORK=1 if worked for federal, state or local government versus "private company work."

that accompanied the questionnaire. All told, the 27 items are a fair summary of the current state of knowledge. When they are reduced to nine factors, as listed in Table 2.3, they can be used as predictors for population health criteria.

DETERMINANTS OF SELF AND DOCTOR'S RATINGS

The two criteria of health in NHANES, self and doctor's ratings, are well known and widely used even though self-reported health has been criticized on the grounds that it is subjective and reflects "morale" and other non-health components. Perhaps so, but it has the remarkable capacity to predict mortality. According to Idler and Kasl (1991), it is not simply a question of knowing one's objective physical decline. A poor self-report is an independent predictor of mortality. They find empirically that the association between perceived health and subsequent mortality not only holds net of controls, but it is stronger than their measure of smoking. The two criteria correlate a moderate .29 so they are not redundant, and may require

divergent explanations. A related fact is that the percent of respondents who rated their health “excellent” was 20.4 percent as compared to 46.3 by the doctors. The latter figure is correct according to the original data source, but it is suspiciously high. As discussed below, one explanation is that the doctors may discount conditions that are medically controlled.

From the perspective of this book, the most important feature of this pair of health indicators is that they reasonably distinguish positive health (vitality) from the absence of disease (wellness). Self-ratings are necessarily sensitive to vitality levels. At the same time, people have only partial knowledge of their diseases. The doctor’s assessment is just the opposite. It focuses on diseases and disabilities and cannot include the subjectively felt energy levels.

The variables used in Table 2.3 are “factors” generated by a computer program (principal components analysis) that finds the intercorrelated clusters in the dataset and calculates scores for each factor. These vary from about -3 to + 3, rather like standard scores. The factors are orthogonal (because of the standard varimax rotation option) to each other, a fact that eliminates

Table 2.3 Correlations of health status measures with factor scores

Predictors	Self-reported	Doctor assessed
Age	0.13	-0.23
Female	-0.02	-0.01n
Black	-0.01	-0.04
Metro	-0.01ns	-0.01 ns
F1 SES	0.40	0.18
F2 CHRONIC	-0.36	-0.27
F3 BPBMI	-0.10	-0.26
F4 JUNKFOOD	0.07	0.02
F5 INFORMAL	0.03	0.00ns
F6 FAMILY	-0.06	0.05
F7 HABITS	-0.01 ns	-0.02
F8 FITNESS	0.09	0.06
F9 OWNBOSS	0.03	0.02
R ²	0.26	0.38

Numbers are coefficients significant at the .05 level or better unless marked “ns.”

DEFINITIONS OF VARIABLES:

Self-reported health=five categories ranging from poor to excellent. (3.2; 1.1; 1-5).

Doctor-assessed health=five categories. (4.2; 1.0; 1-5).

Age=mean is 43.2 years, ranging from 17-90.

Female=2, 52 percent of sample.

Black=1 if respondent is African-American versus all other. Proportion is 12 percent.

Metro residence=1 if respondent lives in central or suburban counties of metro areas of one million population or more.

F1 SES=clubs, teeth and physical training. (Factors are based on indicators in Table 2.2).

F2 CHRONIC=chronic diseases, medications, disabilities.

F3 BPBMI=diastolic and systolic blood pressure, body mass index.

F4 JUNKFOOD=candy, pastries, salted foods.

F5 INFORMAL=get together with family and friends, times per year, telephone contacts with; visit neighbors, times per year.

F6 FAMILY=married, family size.

F7 HABITS=ever smoked (yes), uses alcoholic drinks, does not attend church.

F8 FITNESS=times walks a mile or more per month; grams fiber consumes per day.

F9 OWNBOSS=self-employed, not a government employee.

the multicollinearity threat. Table 2.3 shows the correlations with the two criteria side by side because the correlations in each column have been statistically separated from each other.

Looking first at the initial rows in Table 2.3, it is apparent from the negative coefficients that doctors rate the health of older people and black people lower. Being a woman and living in metropolitan counties are nonsignificant. By contrast, the respondents' self-ratings are positively associated with being older. Holding all the other variables, especially CHRONIC, constant, older people are more likely to rate their health excellent or good. But if they are African-American or female their ratings of health are about the same as those of the doctors.

Chronic conditions and blood pressure/body mass are physical symptoms that the biomedical model interprets as consequences of an unfavorable organism-pathogen balance. They both have strong negative associations with the two health ratings. Doctors evidently consider both high blood pressure and chronic conditions to be strong negative predictors of health. But the small size of the correlation (-.10) for blood pressure and obesity in the first column suggests that the respondents are not so concerned about those problems. What accounts for this pattern? First, the symptoms contrast with respect to their social visibility. For the respondents, chronic conditions are socially more burdensome than the invisible high blood pressure, while doctors believe that the high blood pressure readings (the "silent killer") are a serious risk factor. Second, there is self-consciousness and knowledge. The doctor may discount chronic conditions if they are medically controlled (as in diabetes), and rate hypertension higher because it cannot be completely controlled. The respondent might conclude that a chronic condition is a sure sign of early death, while hypertension is more of a question mark.

What accounts for these divergences? Could the doctor have been conscious of the respondent's status? For age, gender, race and urban/rural residence, the answer is clearly yes. Then the question is how much weight the rater assigned to the status and was the weighting justified in terms of the aim of rating health. These questions are almost impossible to answer. Still, the -0.23 as compared to the 0.13 coefficient for age suggests that the doctors are sensitive to aging and tend to assume that old people have more diseases. Clinical practice probably fosters such an assessment.

The next group of factors consists of the lifestyle conditioners of host resistance; junk food, habits and fitness. They should show a - - + pattern, but in fact junk food shows positive associations with both health criteria. One possible explanation of this surprising finding is that the respondents are suppressing, perhaps unwittingly, information about how much junk food they consume.

The four social determinants factors (SES, family, informal and ownboss) should all predict positively if we accept that social factors determine better health. Ignoring the non-significant coefficients, they meet the expectation, sometimes barely, with one exception (family and health self-rating). In contrast, the correlation between SES and self-rating is especially strong.

One puzzle, then, is why the family factor, which much research and theory has emphasized, did not perform as expected. Perhaps the components vary with regional context. A large family, for example, is an advantage in some regions, but a burden in others. Another possibility is that being married, which is one component of this factor, is ambiguous with respect to health. This puzzle prompts a review of the research tradition that introduced these determinants.

SOCIAL SUPPORT

The key variable of the “social support” paradigm is often referred to as “networks,” “personal ties” or informal affiliations (reviewed in Berkman, 1985; 1986; Broadhead, Kaplan, James et al., 1983; George, 1996; House, Landis and Umberson, 1988; Schoenbach, Kaplan, Fredman et al., 1986; Seeman, 1996). This cluster of indicators was defined early on by Cassel (1976) as help “provided to individuals by primary groups of importance to them,” and it is probably the most widely accepted social explanation of health status. The phrase “social support” will be retained here when referring to the theory, but in discussing the empirical patterns, I will use more empirical terms such as “personal ties” or “informal affiliations.” I will also separate formal participation (membership in associations, etc.) from informal relationships, as George (1996: 233) has done in her review: “Social integration refers to formal ties to social structure. Social support rests on primary relationships in which some degree of intimacy and commitment occurs.”

According to the broad definition proposed by House, Landis and Umberson (1988) and further analysis by Felton and Shinn (1992), the mechanism of social support is the transfer of material, informational and emotional assets to particular individuals. An individual’s informal affiliations are usually long-term and “on-call.” Also, in contrast to the more objective membership in formal groups, informal support has a large subjective component (Turner and Marino, 1994). The hypothesis does not require the existence of a “network” (i.e. where at least some of the friends and relatives interact with each other), which is just as well, because the survey instruments used in this research tradition do not inquire about such relationships.

The central question, then, is whether intimate ties improve health. Locating studies that show the separate effect of formal and informal relations is difficult, but a search turned up eight prospective studies that did so. The basic findings are shown in Table 2.4.

These findings may be summarized as follows: the correlation of formal association and mortality is significant for all eight studies, although in four of them, the results are specific to one sex. Church attendance holds, supporting the hypothesis, for five out of the six studies that included it. The measure of informal relations holds for five of the eight. Given the problems of measurement, these

findings should be taken as support for both formal and informal factors. On the other hand, it is surprising that formal memberships do so well even though the social support hypothesis emphasizes the informal ties.

Table 2.4. Prospective studies of mortality/longevity in the social support tradition

Year	Author	Time span in years	Controls on physical health?	Informal networks	Formal associations	Church attendance
1979	Berkman Syme	9	Yes	Men/women	Women only	Men/women
1982	House et al.	9-12	Yes	N.S.	Men only	Women only
1987	Seeman et al.	17	Yes	Men/women	Men/women	Men/women
1989	Hanson et al.	5	Yes	Men	Men	Un-measured
1989	Moen et al.	30	Proxy	N.S.	Women	N.S.
1993	Sabin	4	Yes	Men/women	Men/women	Men/women
1994	Sugisawa	3	Yes	N.S.	Men/women	Un-measured
1996	Rogers	7	Yes	Men/women	Men/women	Men/women

Note: All samples were adequately large and covered both sexes except for Hanson et al. and Moen et al. who also studied longevity instead of mortality. Men/women means both sexes in sample, but not analyzed separately. The controls varied, but they always included measures of health and socioeconomic status. N.S. = no significant findings.

All but one of the prospective studies controlled on health level at the baseline, effectively ruling out reverse causation. The studies show that regardless of the initial state of the person's health, social support and participation is correlated with better health. The initial level of health does not determine participation. On this point, the burden of proof is now on those who raise that objection. This type of control, however, does not address the counter hypothesis that both health and personal ties have a common cause such as early physical and perhaps genetic development. But that objection has never been adequately specified. We lack a plausible candidate for the common cause and a pathway linking "superior endowment" to both health and social participation.

Only a few studies, it seems, have actually inquired into the details of informal affiliations with the aim of finding out who gives what kind of support. Seeman and Berkman (1988; see also Cutrona, 1986) found that for the elderly people in their sample, the number of affiliations, face-to-face contacts and close ties predicted the perceived availability of both instrumental and emotional support, but frequency of face-to-face contacts determined their perceived adequacy. These authors were surprised to find that neither spouses nor children were sources of support. They argue that after age 65 spouses are not as important as a “confidante.” Such close friends are sources of both instrumental and emotional support, while friends and relatives are more closely associated with emotional support.

Their most remarkable finding was that over half of their sample reported no close contacts with children, close friends and relatives or a spouse, yet they still felt that instrumental and emotional support was available. Social support researchers who include formal participation indicators (clubs, etc.) might point to these as functional alternatives, but that claim needs more research. Do some people feel that they are supported even without specific ties? If so, where does that idea come from?

The Berkman and Syme (1979) measure of support combined four kinds of indicators: contacts with friends and relatives, marital status, church attendance and membership in clubs and associations. Subsequent research has only occasionally added new categories, such as work and leisure. The problem then is the implicit claim (as required by the theory) that participation in clubs and associations measures support. That is unlikely because, by definition, formal organizations have a name and a purpose, and such purposes cannot include personal attention to the members. The whole point of formal organization is to suppress individual-oriented behavior in favor of group activity. As the Rotary Club pledge puts it, “Service above self.” That is true even in sports clubs and choral groups. No matter what the group’s purpose, it cannot function as a group if the members are concerned about themselves. The apparent exceptions, such as group therapy and “health clubs,” are fee-for-service businesses, and fall outside the formal participation category.

In defense of their interpretation of formal participation, social support advocates might argue that the kinds of close friendships that provide personal support can exist in the context of formal memberships. But such friendships that did form would already have been counted separately under the informal category that appears in most questionnaires. That leaves the camaraderie in clubs and associations as a possible functional equivalent of friendships, a rather thin substitute. Thus, formal participation cannot be construed as a proxy for informal affiliations.

Another reply that social support advocates might make is that the four-item index is measuring “social integration” and was meant to be wider than informal ties. This claim echoes the “individual in society” paradigm of the 1950s and is succinctly encapsulated in the definition of integration that Kawachi, Kennedy and Wilkinson (1999:158) propose: “A socially integrated individual is one who has many social connections, in the form of both intimate social contacts (spouse, friends, relatives) as well as more distal connections (membership of church groups and voluntary associations).” This is a comprehensive definition, but it does not square with the emphasis on personal ties that runs like a red thread through almost all discussions of social support. Advocates of social support want it both ways: informal affiliations

for explanations and “integration” (with both informal and formal indicators) for measurement that produces strong correlations.

The simple remedy for this problem is to delete all formal participation items from the composite indices. Unfortunately, the nearly certain consequence of this move is to reduce the predictive power of the indices. We can be reasonably sure that they will be weaker because informal affiliations are especially sensitive to context and such variation reduces the strength of correlations. Berkman and Syme (1979) and others (Shye et al., 1995) implicitly raised this point when they reported the weaker effects of their index for nonwhites and samples in the U.S. South.

The contingent status of friendships reminds us that the family is more likely to be the organization that deals with the problems of everyday life. Insofar as some of the informal ties are also close relatives (the two categories are rarely separated in the questionnaires), the affiliation count has inadvertently built in the strength of the family, which, given its legal basis, is more than an informal network.

A recent study by Ross and Mirowsky (2002) identifies a mechanism that might explain why informal ties predict health. In their research on subjective life expectancy (the number of years people think they would live), they found, in line with social support theory, that “emotional support” as indexed by positive responses to two questions (“I have someone I can talk to/ turn to”) predicted anticipated life expectancy. But when they controlled on “informal health support” (“I have someone who would take care of me if I were sick”), the initial correlation dissolves. The clear inference is that respondents interpreted emotional support as equivalent to a promise of care.

A related question deals with the general mechanism because it is doubtful whether interpreting the social determinants as host resistance reinforcers will cover the range of variables that have been assembled. Marriage (sometimes), friends (sometimes) and relatives (when they don’t fight) might be interpretable as strengthening the immune system, but it is not obvious why years of education, income or membership in clubs would function that way. And, of course, these variables, some of which are only categories, are ad hoc. So far nobody has tested a “host resistance modifier” that was designed as such.

But there is a deeper problem. Social epidemiologists seem to put the same faith in bureaucratic categories like “years of schooling” as they do in laboratory entities like proteins and fats. “Schooling” may give the impression of solidity that researchers tend to equate with reliability, but the question of what schooling is conceptually remains unanswered. Substituting the abstraction “education” simply compounds the problem. Sociologists have learned the hard way that social variables, whether commonsense responses to household questionnaires or the categories of the census, are usually ambiguous and unreliable and must be conceptually backed. Categories like “resources,” “material factors” or “risky behaviors” are rarely adequate. It is true that many sociologists do not meet this standard of “no indicator without conceptual backing,” and many social surveys are only interested in concrete opinions or behaviors. But theory testing raises the bar and requires new habits of thought.

THE STRESS/SUPPORT INTERACTION

A fundamental question for the biomedical model is how the social variables affect physiological processes. Thus, House, Landis and Umberson (1988) state:

“This idea...of ‘social support,’ or something that maintains or sustains the organism by promoting adaptive behavior or neuroendocrine responses in the face of stress or other health hazards, provided a general, albeit simple, theory of how and why social relationships should causally affect health” (p. 541). They go on to point out that “Clinical and laboratory data indicate that the presence of or physical contact with another person can modulate human cardiovascular activity and reactivity in general, and in stressful contexts such as intensive care units” (p. 542). Likewise, in their pioneering empirical study of social determinants, Berkman and Syme (1979) quote several investigators to the effect that “social and community ties may serve as important factors in promoting host resistance to disease.” See also Seeman’s (1996) review of the literature.

The stress/support theorists summarized in Marmot (2004) point to the interaction of two factors: biological threats and personal ties, with the role of physiological stress implied. Their “indirect effect” hypothesis may be formularized as

$Ph = \text{personal ties/social threats}$

where ph refers to an appropriate measure of population health and the slash signifies a ratio interaction, which is assumed to be positive in this case. This initial ratio determines the subsequent R/T ratio (see Figure 2.1) that is the core process of the biomedical model. The teams led by Cohen (2004; 1997) tested this version of the model using an inventory of life events and susceptibility to the common cold. They found a significant association between the diversity of affiliations and resistance to colds, but they were not able to demonstrate a buffering role for affiliations (difficult under the best of circumstances). Stress and the diversity of social contacts predicted susceptibility independently, the first positive and the second negative. This finding suggests a direct impact of stressful life events on the body’s immune system, but most researchers are reserving judgment in view of the many unexplored possibilities for social buffering.

A REINTERPRETATION OF THE SOCIAL SUPPORT FINDINGS

Despite the unresolved question of direct versus indirect effects of informal affiliations, it is not an exaggeration to say that social support is the core idea of the new field of epidemiology. But most seminal ideas are open to different interpretations. In this case, much can be learned, structuralists would claim, by reinterpreting personal ties as one of a range of adaptive responses that healthy individuals make. A number of researchers (Broadhead, Kaplan, James et al., 1983; Mitchell and Trickett, 1980; Thoits, 1995) have pointed out that a simple shift in perspective would transform informal ties into an attribute of individuals. A moment’s thought reminds us that successful people manage a wide range of activities. They acquire higher education and they advance in their work, they participate in associations and clubs, understand local government, and manage marriage, family and kinship relations. They have hobbies, interests and special skills. They use books and the media but are also physically active. They observe

recommended health practices without going to extremes. It is apparent that the list of attributes includes the four items in the Berkman and Syme index, but these memberships and affiliations are only a few of the practices/habits that we find.

Blaxter's analysis (1990) of the British Health and Lifestyle Survey used an index that approximates this picture of individual-level capacity. It combined marital status, employment status, frequency of contact with family outside the household and with friends, existence of children, surviving parents, length of residence in the area, attendance at a place of worship, involvement in community work and whether the individual feels 'part of the community' (1990:105; 247). Blaxter acknowledges that the scale is multidimensional, but this wide purview is precisely what we would expect of superior adaptors. Blaxter's list reminds us that just about any of these activities could become the basis of a theory of health, especially if it is supported by empirical findings. But singling out one strand of a large skein is a risky starting point for conceptualization.

CHAPTER 3 MEDICAL TECHNOLOGY

We may define medical technology conventionally as all the knowledge and techniques that health specialists use in their attempts to improve the health of a population. This broad definition includes the efforts of public health specialists, of personnel who provide individualized preventive services and those who offer curative interventions. Given this definition, it is hard to deny that health technology can affect population health rates, and the evidence presented in this chapter supports that claim. But preventive and curative medicine must be distinguished. Much technology is designed to cure the pathogen-caused diseases, after the damage is done, so to speak. Even if all cures were successful, it is difficult to see how these interventions could affect population health rates. They are individual interventions and cannot reach the mass of the population that determines mortality rates.

It seems more reasonable to credit the public health technology that blocks the pathogen before it ever reaches the body. It is hard to imagine modern cities achieving acceptable health levels without clean water and sanitation and similar public health technologies. And pharmaceutical companies commit huge resources with the aim of creating vaccines for a wide range of diseases. Faced with this evidence of success, structural theory may be judged perverse in its denial of a conceptual role for medical technology on the grounds that it is a changing variable as it adapts to the shifting microbial threats. This seems like theory becoming so rarified that it loses touch with reality. Structural theory goes on to argue that health technology is not limited to the knowledge of specialists because ordinary citizens, working through their governments, develop programs like Head Start and Social Security and encourage the democratization of college education, and these are behind the rise in life expectancy. More generally, it claims that all the other organizations in a community may increase population health via their problem-solving contributions. Thus, the organization of agricultural and industrial production, of commerce, of relations with other communities, and defense may be stronger determinants of population health than medical technology.

LEVELS OF MEDICAL TECHNOLOGY

It appears, then, that the structural picture of how communities function provides only a limited role for medical technology, as a component of the varied and continuous problem-solving that communities at all levels maintain. This view diverges from the vast importance that the population at large assigns to such technology, especially curative medicine, and the clash of perspectives is sharpened by the structural claim that the activities of superordinate levels determine, additively, the health of a population. In an effort to make this multilevel perspective more concrete, Table 3.1 lists examples of preventive medical technology that appear at the community levels typically found in industrialized countries. Structural theory acknowledges this type of public health and claims that future research will identify an equally long list of social policies and practices that augment this list and may

supersede it. But that is in the future, so the list in Table 3.1 is best considered a baseline.

Thus, the national government takes primary responsibility for monitoring and controlling epidemic diseases and bioterrorism. It also supervises health insurance and drug and food quality. Underlying all these is an expanding legal framework which, although it falls outside the conventional scope of public health, is a precondition for all of these more visible protections. At the state and metropolitan level we typically find technology for monitoring and neutralizing contamination like smog or chemical spills, and this level also supervises large health facilities such as hospitals. (See Conway, 2001, for a comparable stratification of services for rural areas and the appendix of the Institute of Medicine’s 1988 comprehensive overview.) In the event of a terrorist attack, the security personnel at this level are likely to be the first responders. In addition, and again outside of conventional public health, officials at this level are constantly dealing with deindustrialization, which means job losses and a pervasive drag on health.

Table 3.1 Typical public health technologies by community level

Community level	Examples of health technology
National	Epidemic control, health insurance, disaster relief, food and drug quality, legal framework for health and disability
State/metro regions	Contamination and insect control, highway safety, hospital regulation, defense of the local economy, disaster preparation
County/city	Water quality and waste disposal; motor vehicle control, hospitals, clinics and ambulances
Township/village	Primary care, volunteer work and charities, first aid
Neighborhood	Crime watch; monitoring dangerous locations, mutual aid
Household	Diet, recreation, safety, accessing medical services, monitoring symptoms of members, childbirth and stress management
Individual	Personal health habits, self-monitoring, acquiring information from friends, associates and organizations

Table 3.1 illustrates a number of general principles. First, the examples at each level are not exhaustive. The list is potentially endless because the agencies and activities at each level could be expanded to include all the nonmedical and traditional contributors to population health. The medical organizations can only be separated from all the others by conventional distinctions, and those are not theoretical. Second, the technologies at a given level are often reproduced at the lower levels. Clean water, for example, is a concern both for villages that use spring water and for rural families that must sometimes deal with contaminated wells. Likewise, neighborhoods organize “crime watch” organizations even though the police are

available. A general implication of Table 3.1 is that curative medicine can reasonably be interpreted as the customized technology that compensates for deficiencies of public health organization. Private medicine looms as large as it does because it has a comparative advantage in public relations. In contrast, the public health tends to be invisible to most people. (Compare Lomas, 1998 for similar arguments.)

DOES MEDICAL TECHNOLOGY IMPROVE POPULATION HEALTH?

According to Wildavsky (1977), the belief that private medical care equals health is wrong: “The best estimates are that the medical system (doctors, drugs, hospitals) affects about ten percent of the usual indices for measuring health: whether you live at all (infant mortality), how well you live (days lost due to sickness), how long you live (adult mortality). The remaining 90 percent are determined by factors over which doctors have little or no control...” (105). Wildavsky does not cite sources, but his assessment is based on broad knowledge.

When it comes to empirical evidence on this question, the usual starting point is McKeown’s (1976) historical research on the (non)impact of immunizations. McKeown amassed impressive evidence in support of the generalization that the major infectious diseases of the past had almost disappeared by the time that vaccines were introduced. In showing that the presumed cause appeared after the effect, his graphs effectively demolished (or at least humbled) the pretensions of this type of medical technology. McKinlay and McKinlay (1977) use the same graphic strategy with comparable effect. This whole body of evidence can be summed up by the observation that the rise of population was well underway in the nineteenth century without the help of vaccinations, even though they probably had an impact later on.

Preston and Haines (1991) dispute this conclusion in their historical study of child mortality around the turn of the century. They establish that American children were well fed in 1900, thus contradicting McKeown’s claims for the importance of nutrition, which they find wanting in any case because of the process-of-elimination reasoning that he used to justify his conclusion. In opposition, they argue the more conventional position that a lack of effective medical defenses against infectious diseases in late 18th century America accounted for the high child mortality—18 percent of those under five years. In order to counter McKeown’s claim that immunization was irrelevant, they distinguish between specific medical procedures and general knowledge.

The new understanding of infectious disease processes led to many other forms of innovation besides medicines. Public-health officials had new and vastly improved criteria to use in purifying water and milk supplies, and a much stronger rationale for their work. Individual parents had access to many new, or newly justified, methods for reducing risks in the home: e.g. boiling milk and sterilizing bottles, washing hands before preparing meals, protecting food from flies and other sources of contamination; isolating sick family members; and so on. (1991: 209).

Medical technology, especially the home-based public health practices, could make a difference if it arrived in time. Immunization may not have been effective in the early years, but other forms of public health were. Of course, economic and

social factors made a difference. Urban residence, father's income, literacy of parents, and, especially, race, all predicted mortality, in line with current knowledge. Indeed, Preston and Haines's analysis of a wide range of social determinants is exemplary. But they aim to go beyond these social causes in order to reinstate medical theory and technology as fundamental.

Bunker, Frazier and Mosteller (1994) pursued another approach by estimating the contribution of a wide range of medical technologies used in the U.S. in the clinical prevention and treatment of non-chronic diseases. They found that 14 preventive services such as screening and immunizations added approximately 19 months to life expectancy, while curative services accounted for 45 months. This estimated advantage for curative technology is surprising. Unfortunately, they did not evaluate potable water and public sanitation, which most people believe is the core of public health. That would have strengthened the case for preventive medical technology.

Even so, the Bunker et al. findings are impressive when we consider that great strides have been made in curative technology even in the decade since they completed their research. If medical technology adds an average of 45 months to life expectancy now, what will it do in the future? One new feature of modern technology is that in addition to curing infectious diseases it repairs many bodily malfunctions so that they are "as good as new." The outstanding example of this type of success is the surgical treatment for cataracts, but advances in organ replacements are not far behind. These successes and the additional years of life they bring will necessarily force a reassessment of the preventive-curative debate. Up to now it seemed obvious that prevention was the royal road to improved population health, and perhaps it still is, especially with respect to cost, but it now seems that the road has been widened by conventional medical technology.

This question can be looked at indirectly, in terms of the effects, if any, of easy access to medical care. The classic study is the analysis of the health and mortality of more than 17,000 civil servants working in London that Marmot et al. (1978) followed over 7½ years. Their major finding was that those in the lower administrative grades were more likely to suffer coronary heart disease and attendant mortality. This inverse correlation held after adjustment for age, height and weight, blood pressure, plasma glucose, smoking and physical activity. The research was also able to rule out the effect of selection. Up to this point, the study should have held no surprises, at least for specialists. The results are simply a microcosm of the inverse relationship between mortality and socioeconomic status that holds for all populations. But the Whitehall comparison was made against the background fact that all these civil servants had assured access to quality medical care. While it is possible that the men in the lower grades did not make good use of available medical services, they still had the opportunity if they wanted it. Thus, the Whitehall study did not completely rule out the effect of medical services, but it certainly ruled them out as a major determinant of the systematic differences.

Summing up, the evidence from both historical and stratification studies is mixed, but it provides some support for Wildavsky's judgment that modern medical technology, including programs of immunization, accounts for only a minor proportion of the increased life expectancy since 1900. What other explanations are there? If a persuasive case can be made for an alternative cause, such as nutrition, that

would tip the scales away from medical technology while maintaining the general form of the biomedical explanation. But as the continuing debate on McKeown's nutrition proposal makes clear, there is no agreement on an alternative. These issues are discussed at length in Schofield and Reher (1991), Perrenoud (1991) and Szreter (1988), among others.

EVALUATING TECHNOLOGY: POPULATION HEALTH AS CRITERION

There is a larger point embedded in the discussions of the efficacy of medical technology. It is that population health is the best criterion for evaluating its contribution. Kaplan (2000) and Kindig (1997), among others, have made the case for using population health measures for evaluating medical technologies and, in principle, interventions of any kind. Kaplan begins by noting that accountability is virtually nonexistent for health care. He proposes to remedy this situation by using quality-adjusted life years (QALYs), defined as the number of years of life free of symptoms, problems or health-related disabilities. Kindig takes a broader view, accepting QALYs and similar measures as criteria for health-adjusted life expectancy (HALEs). These measures combine positive and negative (absence of disease) criteria despite a clear understanding by both authors of the possible divergent implications of the two types of health.

These population health criteria can be applied to evaluate specific procedures, and that is good as far as it goes. For instance, comparisons of Canada and the U.S. show that in the U.S., heart attacks are more frequently treated with invasive cardiac procedures such as coronary angiography, rather than medication. But the mortality rates at weekly intervals up to one year are virtually identical (Kaplan, 2000:64). Should U.S. doctors curtail such procedures? The pressure to intervene is great, and Americans, both doctors and patients, believe in technology. But as Kaplan points out, there is another option: reallocate resources for preventive education that reduces serum cholesterol, as has been done in California and Finland. Even slight reductions in cholesterol can lower heart disease by one-third.

Education campaigns target the whole community and require population criteria for evaluation. It is not only a question of whether those people who paid attention to the educational message changed their behavior. That is the usual target population, but the new question is whether the mortality rate declined for the total population. Proponents of intervention-specific evaluations will probably object on the grounds that imposing the mortality rate of the whole community is too demanding. A specific intervention cannot be expected to change the general level. But they would have to agree that in principle even specific programs should have some impact on community-wide mortality. If a public health intervention has no effect on an appropriate measure of population health, then that fact must be weighed in the politics of improving health.

Community-wide measures are increasingly available for the states and counties of the U.S. and could be harnessed to the task. Given estimates over several decades and controls on income and level of education, the organized medical facilities and technologies could be evaluated. These assessments could be followed by analyzing the population health effects, if any, of variations in specific health practices. After

assessing these large interventions, researchers would meet diminishing returns because activities like cleaning up small toxic waste sites or running seat belt campaigns would probably not show a significant impact on the whole community. And conclusions would be complicated by the debates over questions of how long to wait for an effect or whether all the other possible factors have been controlled. But, of course, we have those disagreements already.

Although showing that interventions actually make a difference in population health criteria is the initial step, it is also necessary to integrate the findings within a theoretical framework. Only then can the researcher establish the independent contribution of an intervention. For example, Kaplan begins his essay with a discussion of the McGinnis and Foege (1993) ranking of the causes of death in the U.S. for 1990. These are relevant to proposed interventions because tobacco and excessive food consumption lead the list, accounting for 19 and 14 percent of deaths, respectively. Alcohol, microbes, toxic agents, firearms, sexual behavior, automobile accidents and drug use account for another 17 percent. Half of all deaths are unaccounted for, and the authors suggest that they may be due to “unquantifiable” causes like socioeconomic status and access to medical care.

Not surprisingly, McGinnis and Foege conclude that there is a mismatch between expenditures and causal importance. In their view, too little public health money is spent on smoking and over-eating. But these categories give a false sense of causation because these variables interact in various ways, “dosage” changes their impact and they may substitute for each other. More fundamentally, they are vulnerable to the charge that other more distal causes have been ignored. But the claim of more fundamental “upstream” causes turns on theory, whether the researcher is guided by the biomedical model or by a version of social epidemiology of the type reviewed in the next chapter.

THE PUZZLING DOCTOR-MORTALITY ASSOCIATION

What form would evaluations of medical technology, as embodied in organizations and personnel, take if population health were the criterion? The U.S. county data provide an answer, as shown in Table 3.2.

Table 3.2 Regression models using medical facilities to predict age-adjusted mortality in U.S. counties N=3022

Predictor	Model 1	Model 2
Median income 1989	-0.41*	-0.30*
Hospitals (log)	-0.25*	-0.16*
Physicians tt (log)	0.20*	0.16*
Pct black, 1990		0.46*
R ²	0.17	0.36

Source: Young and Lyson (2001). tt = per 10,000.

Model 1 shows, first, the contribution of median income, a required control, to the prediction of age-adjusted mortality. It is strongly and significantly negative, as expected. The next two rows show the impact of hospitals per 100,000 and doctors per 10,000 (logged). Although both coefficients are significant, that for physicians

is positive, which makes no sense. But, as discussed below, many other studies have turned up the same disconcerting correlation. The second column adds the proportion of African-Americans, and this disadvantaged minority is strongly and positively significant. In sum, the two “controls” explain most of the variance; the two measures of medical technology are weak and the sign of one is in the wrong direction.

This table raises several issues. First, why does the number of physicians predict more deaths? This question is fundamental because if measures of medical organization produce artifactual results, they cannot be used. Of all the indicators of medical facilities and technology, the per capita availability of physicians is surely the most popular. The data are more likely to be available and physicians per capita are a reasonable proxy for the whole medical complex. Yet study after study (summarized in Young, 2001a) shows positive correlations between doctors per capita and mortality rates. Cochrane, St. Leger and Moore (1978) first reported this “embarrassing” finding and attempted to explain it by introducing a range of test variables aimed at dissolving what is surely a spurious correlation. But their efforts were unsuccessful.

Working two decades later, I attacked the problem from a different angle and succeeded in dissolving the correlation in two of three tests. My explanation postulated two kinds of dynamics that typically occur in newly industrializing areas of relatively developed countries. First, rural people migrate to these areas in search of work, and they typically take the hardest and most dangerous jobs. In doing so, they are cut off from their home villages. At the same time doctors move to these expanding centers seeking new patients. The new doctors are usually unable to effect economies of scale, so more are required to fill the need. But they rarely serve the rural newcomers. The statistical consequence of this “market distortion” is the positive doctor-mortality correlation.

During 1950-70 Japan experienced a surge of industrialization in its southwestern prefectures that produced a positive doctor-mortality correlation. Controlling on the regional dichotomy (core around Tokyo versus the two peripheries), the initial correlation disappeared, which is the usual fate of spurious correlations once the correct test variable is found. Analysis of the U.S. counties produced a similar result when those in the southern states were separated out. The South experienced increased industrialization during the post-World War II period, and many poor rural men, both black and white, migrated to the cities and to premature deaths.

Later research revealed a second process that may account for the spurious correlations in stagnant depopulating regions such as the U.S. Middle West. Table 3.3 shows a test of what seems to be a reverse process: youth migration from rural counties, leaving the elderly, along with their doctors, in place, resulting in the same oversupply of physicians (i.e. the .15 coefficient). The correlation between physicians per capita and mortality, controlling on income and percent black, changes from .15 in the rural counties to .06 in the urban counties, and then to -.12 in the metro counties. A complete analysis, not attempted here, should establish the presence of a low-skilled replacement population. The control on percent black was necessary to exclude the newly industrialized regions in the South that reflect the opposite process.

Table 3.3 Regression analysis of mortality in three types of U. S. counties

Predictors	Rural counties	Urban counties	Metro counties
Physicians /10000 (log)	0.15*	0.06*	-0.12*
Median income 1989	-0.31*	-0.30*	-0.27*
Pct. black	0.36*	0.50*	0.55*
Adjusted R ²	0.28	0.43	0.43

Note: The trichotomy of rural, urban and metro is derived by collapsing categories in the Beale ten-category classification (Butler, 1990). *=significant at the .05 level.

THE COST PROBLEM

A practical question that looms behind the theoretical explanations for population health differentials is whether they can contribute to the practical management of the rising costs of health care. To jump ahead, the theory proposed here opens the door to the possibility of simply reducing the number of people who go to doctors and hospitals. That is not such a preposterous idea, and indeed it is happening all the time. Public health in almost all large cities protects the population from waste and water-borne epidemics, while immunizations target a long list of contagious diseases. Without these mass protections, medical facilities would be overwhelmed, as they often are whenever influenza gets out of control.

The basic facts of the spiraling cost of medical care are well-known. More and more people in the U.S. have lost their insurance, if they ever had any, and employers are reducing benefits or cutting them out altogether. Medical technology improves, doctors prescribe more costly drugs and procedures, and patients demand them, regardless of cost. The fundamental dynamic is like a gambler's addiction, where the promise of great rewards goads the player to ever increasing expenditures on "chips." And that is what they are, given the patient's ignorance of medical technology and the inherent unpredictability of medical interventions.

The cost of U.S. health care in 1993 was a third more than the next country, Canada (Kindig, 1997; Cowan, Catlin, Smith and Sensenig, 2004). The U.S. situation is usually described as exceptional. Perhaps, but the health care addiction is spreading and accelerating. The per capita expenditures in the U.S. doubled in less than 10 years, during 1985-93 (and increased 63 percent in the nine years following). The rate of increase, although not the level, in the major western countries is about the same. More ominous is Kindig's (1997:28) graph that shows health care expenditures in the U.S. increasing while those for education are declining. As will be shown later in this book, education is an unrecognized form of public health. So what we are looking at is the triumph of immediate curative over long-term preventive actions.

Discussions of the relationship of mortality and per capita income often single out countries like Costa Rica (Caldwell, 1986) or Albania (Gjonca, 2001) as examples of better health at lower cost. The same strategy of holding up dramatic examples is used to illustrate "negative deviants" such as the U.S. with its low health levels relative to large expenditures. For rhetorical purposes, such examples make the

point. But if we are interested in explaining why these deviant cases appear, we need a more systematic technique for identifying cases.

Health/income discrepancies are important because it is widely believed that economic factors explain population health differentials. At the individual and family levels, the economically advantaged have access to better care, superior diets, safe environments and sanitation. Affluent communities may even use tax dollars to provide high levels of public health and welfare for the poor. (See Robert and House, 2000 and Riley, 2001 for similar arguments.) There are of course objections to these claims, but there is no question about the widespread belief that money buys health.

Regression analysis offers an easy way to look at population health differentials net of income when the aim is to identify communities that make efficient (or inefficient) use of their health investments. This can be done by regressing age-adjusted mortality on the average income of the counties and then using the residuals (the unexplained variance) as the criterion variable. (See Wang et al., 1999, and Leigh and Dhir, 1997, for recent examples of this well-known technique.) This procedure sets up the task of accounting for the over- and under achievers relative to income. The poor counties that have better than expected health can still be pinpointed but knowledge of over- and under achievers at all levels of income is especially important in moving toward causal analysis.

Mortality was regressed on income for all U.S. counties, with the result that the list shows 84 overachieving and 63 underachieving counties, totaling 147 deviant counties out of approximately 3000. Examination of the state locations (not shown) reveals that the overachievers are mainly in the Midwest in a belt extending from North and South Dakota to Colorado and Texas. With 12 deviant counties, Kansas contains the largest number. The counties in the underachieving category are primarily in the South. The only overlap between the regional location of the two groups is the three South Dakota counties where there are Indian reservations. (See Hart, Ecob and Smith, 1997 and Langford and Bentham, 1996 for similar geographical uses of residuals.)

These results are interesting in themselves, because it is surprising to see that the over-and underachievers are concentrated in large regions. As possible causes, structural theory points to the corrosive effect of de facto racism in the U.S. South and to defensive mobilization by way of conservative religion and politics as described in Frank's (2004) provocative analysis of the depopulating Midwest.

Cases that show positive deviance are much discussed because they pose the deeper question: if income does not account for the overachievers, what does? Sen (2001) cites Sri Lanka, China and the Indian state of Kerala and argues the importance of the mutual support that people and government agencies in these countries provide. Caldwell (1986) takes Costa Rica as his case and emphasizes the way "open" societies orient the government toward better health policies. Others, such as Hayward, Pienta and McLaughlin (1997), have identified a number of indicators of environmental hazards in urban areas that might account for the health/income discrepancies. Almost all researchers pay attention to the medical and welfare agencies that are supposed to deliver health, net of average income.

This book argues that there is a non-medical way to expand the scope of public health, one that turns on the management of threats to communities. It claims that unmanaged threats, like the closing of a plant or ethnic conflict, can reduce the vitality of whole populations and increase death rates. Said another way, only a new branch of public health, one based on social problems, will slow down the rising costs of health care. The possibility of an alternative form of public health is explored in Chapter 9.

CHAPTER 4 SOCIOECONOMIC STATUS AND HEALTH

Of all the social determinants, socioeconomic status (SES) shows the strongest correlations with measures of population health. Only recently, however, have researchers become conscious of the need to find one or more “mechanisms” that link SES to health (Adler and Ostrove, 1999). Previous research (circa 1970-1984) was content to “control SES out” in order to demonstrate that a proposed risk factor, say, lack of exercise, showed an independent effect. Now the “SES effect” on health can no longer be ignored. It is strong and persists despite controls on the many variables that the biomedical explanation suggests might explain it. (See Haan, Kaplan and Syme, 1989 and Macintyre, 1997, for similar appraisals of the persistent SES effect.)

Marcia Angell amplifies this problem statement in a brief but penetrating essay (2000): “Yet despite the undoubted importance of socioeconomic status to health, no one knows which aspect of social standing matters—wealth or education or occupation or some other condition—much less how it operates. We are dealing here with a black box—the most mysterious and powerful of all determinants of health. Differences in medical care seem to account for only a small part of the effect.... The lion’s share of the effect is caused by other factors, mostly unknown. Since it is inconceivable that money in the bank or a sheepskin on the wall could directly affect health, they must be markers for the real factors that matter...What might those factors be? Most good studies of the subject—and there are lamentably few—try to control for the usual suspects, such as cigarette smoking and heavy drinking, both of which are more frequent among people of lower socioeconomic status. Even after controlling for them, the health disparities across social strata persist, although they are lessened.”

Socioeconomic status refers to a cluster of interrelated indicators of desirable individual and family attributes relevant to material and social well-being. They include income, wealth, material possessions, occupational prestige and similar characteristics. The list also includes education in the sense of years of schooling and other attributes closely associated with it. In the analysis that follows these measures must be handled empirically, which is how they are treated in the literature. Measures of income inequality are excluded from the discussion because they turn on a different principle. SES is open-ended and, in principle, without limit. Not so with inequality, which is a relationship between the haves and have-nots and ranges from a lower limit of zero to a ceiling of one.

Essentially, then, we are looking at the interrelationships of two clusters of social indicators, SES and health. The challenge is to find an adequate explanation for the associations between them. Such an explanation should guide the choice and construction of indicators and the nature of the intervening “mediator(s)” (Anderson and Armstead, 1995). Indicators of the proposed mediators—medical access, lifestyle habits, physiology and the like—must be shown to correlate with SES and also with a measure of health, and controlling on them should reduce the initial correlation

to zero (or close to it). Given the problems of measurement, no single test is likely to be conclusive, but the combination of empirical test and conceptual framework should make one explanation more plausible than the others.

This chapter puts to one side issues like the direction of causality, reciprocal effects, social selection, the relation of SES to class and race, and the interrelations of the various indicators of SES, among others. These questions are not relevant to the argument or they have been resolved well enough for the purposes of this chapter.

THE IMPERVIOUS SES-HEALTH ASSOCIATION

The principal feature of the SES problem is illustrated in Table 4.1, which shows that education and income continue to predict better health despite the inclusion of the wide range of possible determinants available in the NHANES dataset that was used in Chapter 2. In contrast to the doctor-mortality correlation discussed in Chapter 3, the SES-health correlation is not a spurious correlation. It is or could be a causal relationship if we could find the intervening links. A possible mediator is exposure to germs. Poor people suffer more illnesses than more affluent people because they are more exposed to pathogens. Therefore, holding diseases constant should dissolve the initial SES-health correlation. But controls on illness and disability do not greatly reduce the income and education correlations. Similar controls on other mediators produce the same result, deepening the mystery of the SES effect. Table 4.1 shows the invulnerability of SES against a range of possible mediators.

As criteria, Table 4.1 uses the two types of health assessments, self and doctor's, previously described. As predictors, it focuses on the kinds of variables that biomedical advocates emphasize. The statistical technique is regression analysis, which calculates the contribution of each of the variables net of the others.

According to the biomedical model, controlling on all these mediators should dissolve the correlation between income and health. But it does not. Schooling shows correlations (when all other variables are controlled) of .22 and .06 with self-reported and doctor-assessed health, while income is related .12 and .08. Only one other variable, exercise, shows such a high correlation, but it is almost certainly redundant with education. The components (jogging, bicycling, swimming, aerobics, etc.) of that index are activities that college-educated people are likely to choose. In short, the exercise index overlaps with schooling and income.

Table 4.1 Regression analysis of two measures of health showing strength of education and income despite a wide range of controls. N=18,150

Variable	Positive self-reported health	Positive doctor rating
Age	0.05	-0.33
Female	0.01ns	0.03
African-American	-0.02	-0.06
Schooling	0.22	0.06
Income	0.12	0.08
Chronic conditions	-0.13	-0.07
Health problems	-0.12	-0.04
Disabilities	-0.02	-0.12
Ever smoked	-0.04	-0.02
BMI	-0.08	-0.23
Pct. fat intake	0.02	-0.00ns
Pct. fiber intake	0.00ns	0.03
Exercise score	0.16	0.05
Alcoholic drinks	0.01ns	0.00ns
Time since doctor	-0.02	-0.03
Takes medications	-0.12	-0.06
R ²	0.25	0.36

Numbers are unweighted regression coefficients. All are significant at the .05 level unless marked with an "ns." Source: NHANES III, 1997.

VARIABLE DEFINITIONS:

Age= range of 17-90, with mean of 43.2 years

Female=1, 53%

African-American=1, 12%

Chronic conditions=sum of heart+arthritis+high blood pressure+cancer +cataracts+hayfever +emphysema+bronchitis+asthma+stroke.

Mean=.72; ranging from 0-7. Percent 1+ = 51.7

Health problems= 1 if had to change work or housework due to health problems. Mean=13%.

Disabilities=1 if respondent was observed in bed, or in wheelchair, crutches, shuffling, hands or legs paralyzed, hearing or speech impaired or with persistent cough. Mean=.19: 0-8. Percent 1+= 11%.

Ever smoked= 1 if respondent has smoked at least 100 cigarettes in lifetime. M=53%.

BMI=percent body weight (kg)/height (m²) calculated by researchers. M=26.3, 12-80.

Pct. fat intake=percent kcal from fat. NHANES calculation. M: 33.5, 0-83.

Pct. fiber intake=fiber (grams) consumption per day. From NHANES. M=16.7, 0-134.

Exercise=sum of following activities in last month: jogging/running, bicycling, swimming, aerobics, dancing, calisthenics, gardening, lifting weights or sports. M=1.9, 0-8. Percent reporting one or more activity=68.7.

Drinks=1 if respondent reports at least 12 alcoholic drinks in last 12 months. M=54%

Time since doctor=months since last saw a doctor. M= 36.9 months, 0-120.

Takes medications=1 if has taken any prescribed medicines in the last month. M= 44%.

A different kind of redundancy accounts for the associations of “chronic conditions” and BMI with lower health ratings. Now the overlap is definitional. People with chronic conditions are not likely to use an adjective like “excellent,” and doctors are not likely to rate a person’s health as high if they are elderly, have disabilities and are overweight.

Studies of health status have become more and more frequent in the last several decades (Kaplan, 2001) and almost all of them include SES measures, if for no other reason than to eliminate the effect of what biomedical researchers once referred to as a “nuisance” variable. Oakes and Rossi (2003) counted 3544 relevant studies published during 1990-99. If only ten percent paid attention to the SES problem, that would constitute a tremendous effort. These studies have tested a wide range of possible determinants, and at least one review has concluded that the quest has been unsuccessful. According to Lantz, House, Lepkowski et al. (1998: 1703), “previous efforts to explain socioeconomic differences in mortality in a variety of subpopulations have found that strong differences remain after controlling for major lifestyle risk factors.” The situation is especially remarkable because schooling and other measures of SES are typically stronger than determinants such as smoking.

For advocates of the biomedical model, there is an additional hurdle because any explanation they propose must conform to the reductionist format of that model. As outlined in Chapter 2, its essential feature is that causation turns on physiological processes, especially the immune system. That is why the illustrative test in Table 4.1 excluded the many social determinants of health. Given the format of the biomedical model, which requires that any distal determinants must “work through” the proximate determinants, no “end runs” are permissible. Yet that is precisely what the persistent SES correlations show. They imply a direct effect that contradicts the model in the most fundamental way.

Why have the many attempts to dissolve the effects of education and income in Table 4.1 been unsuccessful? Robert and House (2000) believe the solution may require as many as 25 variables. The pressures on poor people are diverse and will require many different variables to account for the association. They recommend a broad array that covers the biomedical, environmental, behavioral and psychosocial risk factors. The study of risk factors by Lynch et al. (1996) illustrates this empirical strategy by introducing 23 mediating variables that reduced the excess relative risk of all-cause mortality by 85 percent for a sample of Finnish men, effectively dissolving the initial income association. In addition to age, the fourteen biological risk factors included fibrinogen, high density lipoprotein cholesterol, serum apolipoprotein B, copper, hair mercury, systolic blood pressure, body mass index, among others, while the behavioral factors included cigarette smoking and physical activity. These are interpretable as biological and conform to the reductionist format of the biomedical model. But the authors provide no conceptual rule for selecting indicators so it is unclear whether the result can be replicated. It is also possible that the relatively

egalitarian income distribution in Finland makes this a special case. The study nonetheless illustrates the format for dissolving the initial correlation within the biomedical model. Future research may still find the crucial biomedical variable that will dissolve the SES correlation, but that hope is beginning to fade.

ADDITIONAL SES EFFECTS

Although of lesser importance, the most dramatic feature of the SES-health association is its “gradient” (Adler, Boyce, Chesney et al., 1994) when displayed as a bar graph. The term gradient refers to a stepwise relationship of better health with each increment of SES (Haan, Kaplan and Syme, 1989; Elo and Preston, 1996; Kaplan, 2001; Kitagawa and Hauser, 1973; Marmot, Ryff, Bumpass et al., 1997; Syme and Berkman, 1976, among others). It is not simply a problem of a threshold effect that separates the very poor from the rest of the distribution. The gradient holds for both sexes, all ages and everywhere it has been studied (Dutton and Levine, 1989; also Syme, 1996; Deaton, 2002; and Marmot, 2004). It is not changed significantly by the indicator of SES that is used. (See Mackenbach and Bakker, 2002, for the European data.)

Using NHANES III data, Figure 4.1 shows the distinctive gradient for schooling and health, especially for the upper grades where school grade definition and retrospective memory are probably better. For men, the percent reporting their health as “excellent” increased relative to the previous level for 14 of the 17 years of schooling. For women (not shown), the ratio was 13 out of 17. The patterns for the 11 income categories were similar.

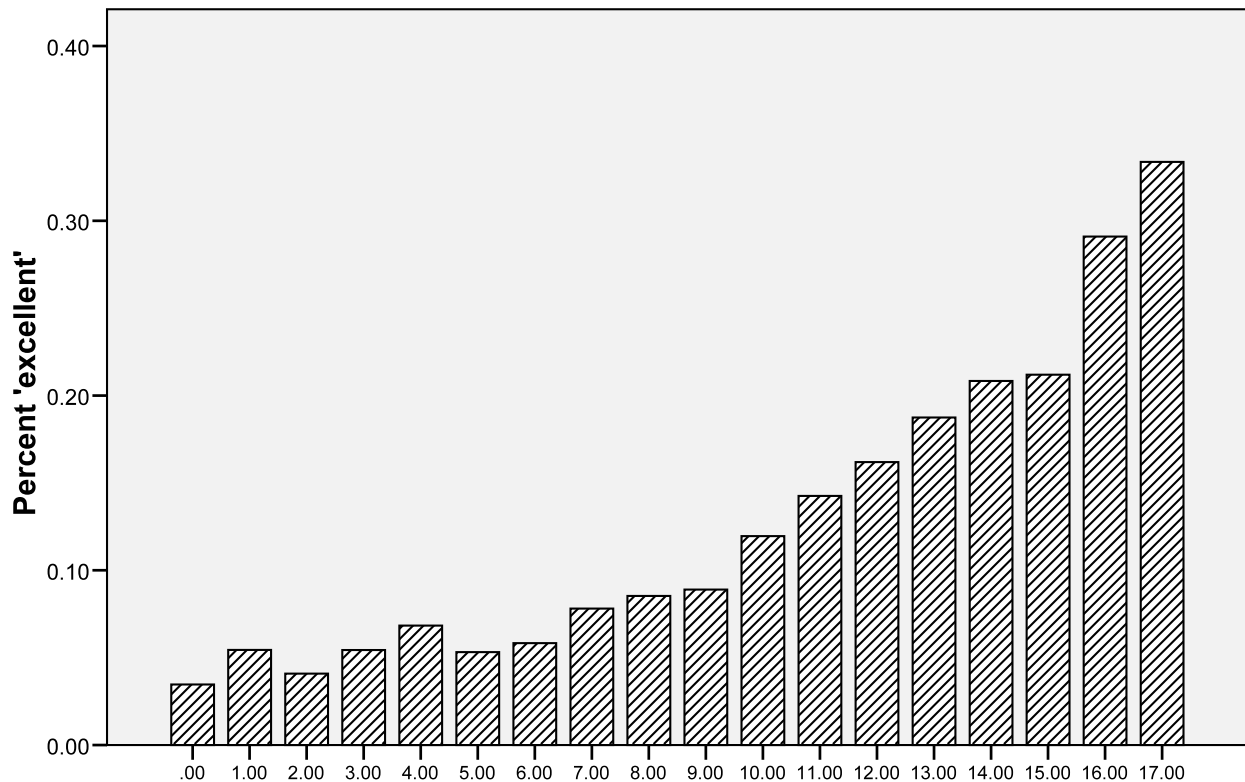


Figure 4.1 Self assessment of excellent by years of schooling

It is unlikely that observer bias could account for these distributions. A doctor might believe that educated people are generally healthy and build that fact into the final assessment, but it is unlikely that he/she would be biased in the complex way reflected in the distribution. Similar reasoning rules out the economic explanation. Economists might argue that money buys health care while education improves the choices. But would this explanation account for the yearly increments? It is hard to see how the economic explanation could handle finer gradations.

A second SES effect is the reduction of mortality from a variety of diseases. Syme and Berkman (1976) reported early on what may be called the “broad spectrum effect,” and Marmot, Bobak and Smith (1995:173) noted it in the Whitehall data: “A second provocative finding from the Whitehall Study is that social differentials in mortality apply to most of the major causes of death. This observation broadens the explanatory task beyond the one with which we began—the social gradient in coronary heart disease—to the social gradient in a wide variety of other diseases.” (See also Pincus, Callahan and Burkhauser, 1987; Dutton and Levine, 1989:32; Anderson and Armstead, 1995:213; Phelan, Link, Diez-Roux et al. 2004;).

A third feature is the “life-course effect,” the impact of parents’ SES on the health of children (Van de Mheen, Stronks, Looman and Mackenbach, 1998; Lynch, Kaplan, Cohen et al. 1996 (negative evidence); Williams, 1998; among many others) and after formal education has terminated (Haan, Kaplan and Syme, 1989; Guralnik, Land, Blazer et al. 1993). In the NHANES data, for example, both education and income continued to predict self-reported health for people aged 50-90.

A fourth SES effect is that the health gap between the rich and the poor is increasing. This issue is paramount in the British literature (Macintyre, 1997) because national health coverage was supposed to reduce the gap. Recent studies in the U.S. have shown similar trends (Feldman, Makuc, Kleinman et al., 1989; Pappas, Queen, Hadden and Fisher, 1993). The latter list a number of possible explanations: a falling standard of living for those with high death rates, differential access to health care, and more health risks among the poorly educated. Additionally, they list the possibility that people with higher SES have adopted healthy lifestyles more rapidly. These and similar explanations ignore the gradient and do not address the other facets of the problem.

The fifth effect is another kind of interaction, between SES and a range of correlations linking risk factors to health effects. That is, low SES makes almost any correlation larger or smaller. As Marmot (2004:44) puts it, in the occupational hierarchy, “whatever the level of risk factor, being of low grade is worse for your health.” Marmot (2004:148) illustrates this effect with the fact that around 1900, African-Americans contracted tuberculosis at twice the rates of whites. In addition to living conditions that spread the infection, doctors thought that blacks were simply more susceptible. With this finding, it appears that in addition to being invulnerable to controls on possible mediators, SES accentuates the associations between the familiar risk factors (e.g. smoking) and health.

Mirowsky and Ross (2003) call attention to a more subtle aspect of education, its cumulative advantage. The more education, the greater its impact at any one time and over time. This happens because an initial positive effect of education is reinforced by further schooling. A second process is the mutual reinforcement

of positive effects. For example, an increase in the vital capacity of the lungs can enhance other physiological systems. Of course, the process can also be undesirable, as when body fat accumulates over time and impacts negatively on the arteries and on blood pressure.

It is quite likely that other SES effects will be identified, but these are sufficient to make the point that the SES problem is multifaceted. Therefore, an explanation of one effect that does not apply to the others is deficient. On the other hand, a partial solution should not be discarded until all efforts to generalize it have failed or the recalcitrant effect has been disqualified. This requirement underlines the necessity for conceptualization, but it too has its pitfalls. Many abstractions are sterile. Terms like resources, control, power, status, efficacy and the like must be specified in ways that guide measurement. Otherwise they allow for such a wide and undisciplined range of measures that the hypothesis can never be falsified.

Caldwell (1986; 1989) has introduced a psychological interpretation of the effect of schooling. He rejects the quality and content of schooling in favor of a psychological transformation: “It is not so much what you learn or understand, but how you see yourself and others see you” (1989:106). He introduces the term “autonomy” to summarize this personality development and goes on to illustrate it with observations about the greater tendency of educated mothers to do something about a sick child, persisting until they get satisfactory treatment. Ultimately, however, it is the care, both at home and from medical personnel, that causes the child to be well. Autonomy is a reinforcer, not a direct cause.

Caldwell’s is one of many proposed psychological mediators that Mirowsky and Ross (2003) review in the course of making the case for their measure of “personal control.” This “sense of directing one’s own life” (p. 61) is measured by an eight-item index consisting of questions such as “I am responsible for my own successes,” and, negatively, “Most of my problems are due to bad breaks,” and the like. This measure correlates with education and with health practices, which link to health in a well-crafted path analysis. But the analysis seems to beg the question of how education, especially each additional year of schooling, produces personal control and how that personality trait improves health.

A recent contribution to the literature on this problem is Marmot’s (2004) book *The Status Syndrome*. His proposed explanatory processes for the SES gradient are “sense of control” and “participation.” These variables are tied closely to research on the workplace and the many indicators of formal and informal relationships, but Marmot does not specify the theoretical links between these variables and either education or illness, and he seems to avoid explaining the stepwise feature of gradient despite his recognition that it is the nub of the problem.

In a recent article, Link, Phelan, Miech and Westin (2008) elaborate the “flexible resources” explanation of the SES–disease correlations. SES is causal because it reflects the many assets that people use to avoid risks and acquire protection. Although their list of resources is not fixed, they emphasize the role of knowledge, money, power, prestige and beneficial social connections as instrumental in dealing with the threat of disease. They call their framework the “fundamental cause” explanation because it focuses on the variables that initiate the causal sequence and not on the intervening mechanisms proximate to diseases. But a term like that is

unfortunate and will be avoided here. It is a public relations phrase that is meant to call attention to the social determinants of health, especially SES as contrasted with the proximate determinants of disease. But it fails to communicate the essence of their hypothesis, which is flexible resources.

The hypothesis may be stated thus: socioeconomic status → flexible resources → risk avoidance/protective strategies → lower disease rates → lower death rates. As is customary in sociology, SES is defined vaguely as position in society, but Link et al. go on to identify two prongs to the idea: the individual's capacities, and his/her participation in community social organization. Thus, they embrace the "individual in society" paradigm that has dominated sociology for many decades.

The novelty of this hypothesis shows up in their specification of SES as flexible resources, a bundle of assets that may be deployed in different and changing ways to deal with diseases. Knowledge, for example, helps in finding, selecting and applying medical services. Knowledge also improves the person's ability to deal with a wide range of health threats, everything from poor driving habits to neighborhoods with high crime rates. In a similar way, money, power, prestige and beneficial social connections strengthen the individual's survival chances. The "elusive fundamental cause," to use one of their phrases, turns out to be the bundle of flexible resources that derive from SES. In contrast to the "social determinants" paradigm in social epidemiology, which amounts to an eclectic list of social factors drawn from empirical studies, SES is the master multifaceted force.

Link et al. acknowledge the need for more empirical studies designed to produce a well-trimmed Popperian theory tree, but they are not so accommodating with respect to the kinds of conceptual challenges that might be posed. The first question, of course, is whether the hypothesis is testable. Terms like knowledge, power, prestige and the like are so abstract that they set few limits on acceptable measures. About the only guidance is "laboratory practice" which in sociology does not amount to much. A second problem is understanding how these resources help a person to avoid risks and find protective strategies. With all these resources and their application to risk avoidance and protections, how can a person make a successful choice? The standard answer seems to be to "depend on medical science," and, in some cases, the customs of one's class or ethnic group might be added. Some resource-rich people may be able to invent protective strategies, such as ways to "read between the lines" of political rhetoric in order to judge when to flee one's country, but most people must depend on known practices that are linked to diseases and syndromes.

At this point, conceptual analysis becomes murky and is best continued by comparisons with other explanations. Sociologists would probably agree that the term flexible resources is an improvement over an ad hoc list of social determinants or the biomedical model's focus on the immune system/pathogen threat ratio, although strong arguments can still be made for the classical position. Another paradigm that is closer to flexible resources is the problem-solving explanation that is introduced later in this chapter. It is more rigorous in deriving a limited set of institutionalized social problem-solving strategies, and in showing how they deliver improved survival prospects of both individuals and whole communities. It also acknowledges the strength of the biomedical model, as augmented by social determinants, by explicating the role of social factors in reinforcing the physiological path to a disease-free body.

Do these arguments demonstrate that the direct effect of SES is impervious to dissolution by way of mediating variables drawn from the biomedical framework? We cannot reject the possibility that someone will still find an intervening mechanism(s) and formulate a plausible interpretation. But in terms of probabilities, it is unlikely. With the possible exception of the broad spectrum effect on diseases, the SES effects have a strong social component. Yet these can be incorporated into the biomedical model only with difficulty. What if another non-physiological intervening mechanism exists? Such a mechanism could still be biological but not physiological in the way it is used in the biomedical model. As compared to the exquisite adaptation of the immune system to the mostly invisible pathogens in nature, a “molar adaptation” is more oriented to the social environment and typically involves a conscious recognition of threat. An example of such a molar response is the “weathering hypothesis” that Geronimus (1996) has proposed to account for the high frequency of low-birth-weight babies of black mothers. She contends that older black women have typically suffered frequent and varied hardships because of racial discrimination. Such insults affect the reproductive processes and low socioeconomic status exacerbates the impact. White women, in contrast, show no such effects. Geronimus’ term “weathering” suggests gentle aging when in fact “wear and tear” or even abuse might be more accurate. Research will have to clarify whether it is a gradual or an abrupt cause. But the phenomenon makes the concept of impaired molar functioning plausible and suggests a positive side: enhanced holistic functioning.

A SOCIOLOGICAL EXPLANATION FOR THE SES EFFECT

An alternative sociological explanation that claims to explain all the features of the SES puzzle begins with communities and assumes that all communities, if they persist, develop a minimum capacity for “social problem-solving,” and these determine the rate of population health. This theory derives from Durkheim (1951; 1954), but not the side of Durkheim that has informed most epidemiological research. That version may be called “societal attachment” theory and is a type of social psychology. The present explanation elaborates Durkheim’s ideas about the structure of society. The term “structure” refers here to concepts and indicators that are system-wide and institutional (for a given community level). Structural theory eschews aggregated individual behaviors as well as any dichotomous mental categories that some have postulated. It has a formal, content-free character and uses interaction terms more centrally than other theories (Young, 1994; 1999).

A preliminary hypothesis begins with relevant “transaction organizations” to account for population health differentials. “Transaction organization” refers to factories, commercial firms, medical facilities and the like that do the daily work of communities. They cross the community boundary and reflect trial and error over long time periods. But if communities depended only on transaction organizations for dealing with diseases and other health problems, then the basic hypothesis would be simple: $ph = o$, where ph is an appropriate measure of population health and o is an appropriate transaction organization such as the number of hospitals or clinics. Many people believe that this relationship is causal.

But a term like transaction organization (also “agencies”), although necessary for describing communities, is not adequate for testing hypotheses. It is too open-

ended. Which transaction organization? How many? What about a cluster of related organizations such as the “medical complex” or government? And where is the theory that explains the relationship? Most people would point to the biomedical explanation of disease which implies that organizations that bring medical knowledge to bear are causal or at least they influence the physiological processes that do. This issue was taken up in Chapter 3 and it is not likely to go away. Structural theory simply insists that an adequate explanation must include another kind of organization, a set of “structural dimensions” as well as a whole range of non-pathogen threats.

In addition to transaction organizations, communities rely on a number of master problem-solving strategies when faced with serious threats to their neighborhood, city or state. They apply any specialized knowledge (including but not limited to medical knowledge) that may be available, they debate alternative “solutions,” and, if these fail to produce a response to the threat, they may turn to a reform movement that promises to look at the problem from a different point of view. In contrast to the dedicated agencies, the structural dimensions are the general adaptive organization. There are other problem-solving “dimensions,” but these appear to be the most frequently invoked. Chapter 5 elaborates this version of social ecological theory more fully, but these short definitions are adequate for formulating a second hypothesis:

$$ph = (S^*o)$$

where ph is a measure of population health as before, o is a transaction organization and S is one or more of the three dimensions of general problem-solving capacity. Thus, the population health rate of a given level of community is predicted by the combination of structural dimension(s) and transaction organization(s) .

Structural reinforcement (S^*o) increases the level of population health in two ways. The three structural dimensions determine over time the functioning of the transaction agencies in a community. The stronger the “structural profile” formed by the three master dimensions, the greater the likelihood that the community will be well equipped with quality medical facilities, particularly the public health services that protect the population. In addition, the community will have acquired or invented a range of institutions that guarantee security and a stable way of life for the residents. The second intervening process links to the first because membership in a community with superior problem-solving capacity moderates habits that optimize molar biological functions and increase vitality.

The theory acknowledges threats to the community, especially modern forms such as plant closings and forced migrations, that may overwhelm problem-solving capacity. The continuing threat of epidemics may be significant in some regions. The variety of threats that communities may face and their impacts are examined in Chapter 8. The threat category is necessary for a complete theoretical statement, but the structure-agency reinforcement (S^*o) is central.

Figure 4.2 summarizes the structural theory of health using the general format displayed for the biomedical model. As with the latter, it begins with social factors. However, the first column in Figure 4.2 differs from the ad hoc list of social determinants in the biomedical model because the diagram summarizes a general process of structural reinforcement that is causal for all community levels.

The middle column lists the intermediate processes that mediate problem-solving. It too differs from the resistance/threat ratio in the biomedical model in passing the casual processes through to the outcomes column. In the R/T ratio, the distal variables modify one or the other terms, and it is the ratio that is considered to be causal. The third column shows the expected positive outcome which, of course, contrasts with disease-free state that the biomedical model explains.

Figure 4.2 Diagram of the structural model of positive population health

Basic causal process	Intermediate processes	Outcomes
Problem-solving capacity (specialization, policy debates, mobilization)	Participation in superior problem-solving communities (a) moderates practices (b) optimizes molar biological functions	High levels of energy and mental alertness
X		
Transaction organization. (factories, businesses, clinics, hospitals, etc.)		

X=interaction in the sense of mutual reinforcement. Omitted are serious external threats, such as changes in the community's resources that disrupt normal problem-solving capacity. This format holds for all levels of community, from the nation-state down to the household.

In this form, the theory may be transposed to individuals. Social personalities employ the same three master strategies and specific transaction organization as do conventional communities. People continually make distinctions, apply specialized knowledge and mentally debate issues in their "personal parliaments." Solidarity shows up as a commitment to a personal ideology, in the form of a "career," religious or political beliefs. Like communities, individuals must identify problems and try to resolve them. Their life-span depends on their success in doing this.

Transaction organization at the individual level consists of the many activities, including work and participation in associations, by which people deal with daily problems. The list also includes ties of friendship and kinship and the many habits, from handwashing to avoidances (of substances and of feared categories of people) that are thought to maintain health. Thus, the superior problem-solver is the locus of causality at the lowest level of the community hierarchy.

The structural model identifies years of schooling (reviewed in Riley, 2001, ch. 6) as the primary component of SES and assumes, subject to confirmation, that other indicators, such as income, occupation or neighborhood rating are weaker measures of the same underlying process. Schooling correlates strongly with health because it reflects all three problem-solving strategies. It is one of those lucky bureaucratically produced measures like the percent of the population living in cities that reliably summarizes a multifaceted process. The basic strategy of specialization is reflected in the variety of subjects that students take and in the diversity of student backgrounds that forces everyone to make social distinctions very early in life. Pluralism is embodied in the verbal exchanges between students, teachers and their families. Even in authoritarian schools, most children—minorities excepted—tend to argue freely outside the classroom. The third problem-solving strategy, "reform movements," is infrequent in schools, but the competition of teams

is a partial substitute because students quickly learn the importance of loyalty to leaders and teamwork in pursuing a defined purpose.

Schooling teaches the three master problem-solving strategies, but they can be learned elsewhere. Family life stresses solidarity, but until recently most families did not allow much disagreement between children and parents. The contribution of the work environment may be significant, but this varies widely with the organization of the workplace. Somewhat more remote is vicarious learning from history books or the situation comedies on television. More reliable as a pluralism “classroom” are voluntary associations that must allow freedom of expression because volunteers can always leave. Participants in all these organizations develop skill in applying specialized knowledge, in debating the different sides of organization issues and in mobilizing behind a leader or a program. These skills carry over into daily life, improving a person’s handling of problems and thereby moderating habits, including those that biomedical advocates label as “health practices.”

It should now be evident why an additional year of schooling tends to improve health. The social learning (of the three problem-solving strategies) that is important to health status occurs even with only minimal participation in the classroom and regardless of the content of instruction. Both boys and girls profit from this experience. Like language, of which they are an integral part, the problem-solving strategies last a lifetime. They are remembered individually and collectively by the community and available for use over everyone’s life course. This interpretation implies that income and occupational level will usually be less strongly correlated with health status. Although affluent and/or occupationally well-placed families can usually gain entrance to subcommunities with stronger problem-solving capacity, the process does not always work. Education is a more direct indicator.

How would structural theory explain the broad-spectrum reduction in disease death rates? This finding presents a special challenge because the molar definition of population health proposed in Chapter 1 ruled out disease rates. Structural theory applies best to “global” rates like life expectancy. But a “cross-over” hypothesis is possible if we postulate that the optimal biological functioning associated with strong social problem-solving capacity also strengthens the immune system. It is also true, of course, that superior problem-solving families are more likely to adopt and maintain technologies/habits such as dental care, cleanliness, food selection and a gamut of avoidances that fit the biomedical model.

The widening health gap between educational levels is a consequence of people falling behind in the problem-solving skills needed for managing threats, particularly in a rapidly changing economy. Rapid and dislocating social change, as has occurred in Eastern Europe, temporarily increases the proportion of people who experience difficulty in dealing with everyday problems, especially loss of income. Eventually the community-level problem-solving dimensions come into play and provide responses that less advantaged people can appropriate for their personal situations. But the college-educated population, who typically come from superior problem-solving families, may have developed a higher level of capacity, especially for looking at problems from different perspectives. If so, their ability to manage the many new problems inherent in a global world will contribute to longer life expectancies.

The structural explanation of the previously mentioned risk factor/education interaction claims that a high level of problem-solving capacity changes the impact of

blood pressure, smoking, cholesterol and even height. The process begins in infancy where high-capacity mothers find ways to protect and strengthen their infants despite adversity. Likewise, the high-capacity offspring find ways to turn handicaps, even short stature, into advantage. Some short people are able to construct the individual equivalent of a “social movement.” With such an asset, they are able to deal with their environments more effectively.

Summing up, the structural theory of population health provides a plausible account of the SES effects. And like the biomedical model, it must deliver a successful empirical test that is consistent with its assumptions and impervious to contending variables such as those in Table 4.1. If schooling is an all-purpose proxy for the three problem-solving dimensions, more precise measures of these should dissolve the initial correlation. But this expected statistical effect is simply the consequence of improved measurement, and not, as required by the biomedical model, a substitute for a physiological process. The structural explanation uses health practices as mediators and does not depend on specific physiological mechanisms.

ALTERNATIVES TO THE PROBLEM-SOLVING CONCEPT

Structural theory acknowledges a similarity between the problem-solving concept and concepts such as civic engagement, integration and efficacy, but it rejects them because they derive from a premise (methodological individualism) that is antithetical to social problem-solving capacity. For different reasons, structural theory also rejects the “coping” concept that Pearlin and Schooler (1978) introduced as a psychological concept with relevance to health:

coping refers to behavior that protects people from being psychologically harmed by problematic social experience... The protective function of coping behavior can be exercised in three ways: by eliminating or modifying conditions giving rise to problems; by perceptually controlling the meaning of experience in a manner that neutralizes its problematic character; and by keeping the emotional consequences of problems within manageable bounds (1978:2).

Pearlin and Schooler elucidate the coping concept in the context of the individual’s attempts to deal with strains in a way that reduces emotional stress. Such coping is more than defensive behavior, it can be quite proactive. Although the sources of life strains are virtually infinite, their inventories focus on four general situations—marriage, parenting, household economics and work—and measure psychological distress within each of these four areas with questions about unhappiness, frustration, tension, worry, and the like. They are then in a position to test their hypothesis that superior coping ability will reduce or dissolve the initial correlation between strain and psychological distress.

They identify 17 coping “responses” (self-reliance versus advice seeking, negotiation, self-assertion versus passive forbearance, selective ignoring, etc.), but they readily admit that their list is not exhaustive, even though they believe it samples the three major types of coping listed above. As it turns out, they did not find many examples of responses that eliminate the source of distress by modifying the situation, especially in work or household finances. In practice, then, coping works best in micro-situations like the intimate aspects of marriage where a repertoire of individual-level responses can reasonably be expected to make a difference.

In addition to coping responses, Pearlin and Schooler distinguish social and psychological resources. “Social resources” are reflected in interpersonal networks and memberships, while psychological resources are the general strategies people use in dealing with problems, specifically self-esteem, self-denigration and mastery. Statistical analysis reveals that psychological resources are more important in the marriage and parenting situations, while social resources are stronger in the household economics and work situations.

All told, this web of concepts and theory is a fair example of the style of research that predominates in social psychology, whereby words and understandings in ordinary language are abstracted and given empirical reference. There are three obvious problems with this strategy. First, the concepts tend to overlap, so that the correlations among the indicators are almost foreordained. Second, they are ad hoc. As Pearlin and Schooler acknowledge, there are many other possible sets of role strains, types of distress, psychological resources and coping responses. They argue that theirs constitutes a sample of the patterns found in U.S. populations, and that might well be true. It would be more reassuring, however, if they could supply a theoretical rule that would provide guidance in identifying and operationalizing their many patterns. At minimum, we need to know why wife-beating or backstabbing at work are not legitimate examples of coping. And third, the concepts are limited to the micro situations that typically generate emotional distress. They ignore the macro environment that may threaten health.

This kind of criticism prompts the question of whether the problem-solving perspective is any different. After all, it identifies three dominant strategies—applying specialized knowledge, debating options, and mobilizing for reform—and then goes on to argue that these determine the creation or borrowing of a wide range of specific health habits that, in combination with the general strategies, improve health. But the problem-solving perspective acknowledges individual practices. It is the three general strategies that distinguish the problem-solving perspective, and these are derived from a theory of community adaptation, detailed in Chapter 5, that claims the universality of such dimensions for all human communities.

Much the same critique can be made of the many other concepts that psychologists have contributed. Self-esteem, mastery, efficacy, autonomy and many similar notions have elements in common with problem-solving, but they cannot be substituted for it. These notions refer to individuals and only to individuals; problem-solving capacity applies to communities—treating the individual as a special case. This rejection of apparently similar ideas applies to Scott and Howard’s treatment of “problem-solving” (1970:270) despite the common label. For these authors, “a problem is defined as a stimulus or condition that produces demands on the human organism that require it to exceed its ordinary level of functioning, or that restrict activity levels below usual levels of functioning.” So, in addition to crises and acute insults, boredom or sensory deprivation can be problems. Successful problem-solving depends on “an adequate source of energy, appropriate resources, the nature of the problem itself, the organism’s ‘set’ when the problem arises, and the manner in which the organism responds to the threat.” Structural theory finds this definition to be so abstract as to be sterile and sticks with its community-based definitions.

CHAPTER 5 THE STRUCTURAL ECOLOGY OF HEALTH

The analysis of the preceding chapters necessarily focused on families and individuals because those are the primary units in social epidemiological research. In doing so, I may have given the impression that the sociological explanation proposed in this book is an individual-based theory that could be merged with the biomedical model. In fact, they are worlds apart. The version of structural sociology advocated here identifies communities, organized in nested hierarchies, as the locus of causality. These hierarchies have evolved in most parts of the world and function to protect subordinate units. Communities at each level make use of two modes of problem-solving organization, general and specific, as they defend against environmental threats. Over millennia they have developed language-based master strategies that have replaced the less flexible mutation-selection mechanism of animals. Thanks to these master strategies, communities create or borrow task-specific organizations. These may “work” for a time, improving the population health of those communities that adopt them, but when the environment changes, some of them cease to be adaptive. If replacement organizations are not readily available, some communities may embrace a social movement that generates a wide range of social innovations, some of which may become established increments of the differentiation, pluralism and solidarity of the communities. Long-term population health depends on the success of these fundamental macro-structural processes.

COMMUNITIES AS THE LOCI OF CAUSALITY

Community concern for the welfare of the residents sets up pressures to insure that governments at all levels will maintain legal and social boundaries. Otherwise, there is no way of knowing who the community should be concerned about. But apart from definition, common observation points to communities as a fundamental unit of social structure everywhere and back in time. The place-based community, as small as the household and as large as the nation-state, simply has no competitors. Networks, corporations and interest groups are not strong enough or they are not focused on the common good. The individual as a locus of causality is the prominent alternative given its role in harboring pathogens, but when it comes to vitality, individuals are mainly recipients of benefits, not originators. There is a limit to what a person can do for himself to maintain or improve vitality.

The idea of structure, in the minimal sense of collective dimensions, calls attention to the way communities may become well integrated wholes. But structural theory does not make the functionalist claim that communities are always well integrated and that institutions articulate with each other to bring this about. Whether or not that happens is an empirical question. Neither does structural theory envision any other ideal endpoint for communities. The basic idea of problem-solving in a changing and varied environment is antithetical to all teleological goals.

Structural theory also claims that causal sequences need not be reductionist. A train of causality can occur within a given community level independent of

individual-level mechanisms. This statement implies that population health is treated as an emergent property. It also assumes that any intervening mechanisms that are invoked will be interpretable as community-level attributes. This structural picture of communities avoids the (much exaggerated) ecological fallacy except in special cases. (See Sampson and Wilson, 1995, for a similar defense of their city comparisons of crime rates and Menzel, 1950, for an early statement of this alternative to methodological individualism.

TRANSACTION ORGANIZATION

Communities attempt to provide safety, order, and support for economic and other life activities, and to do this they must be fixed geographically or at least in a predictable geographic circuit (e.g. herding groups). Consequently, the geographical and legal boundaries are proxies for the more fundamental social boundaries. The institutions and agencies that cross the community boundaries in the course of doing the work of the community are the “transaction organizations.” They are the extractive industries, the factories, the countless service agencies, commercial firms, market relationships and medical establishments that may be conveniently grouped into production, market and health organizations. The last category assumes that human bodies are part of the environment.

Although all transaction organizations are potentially relevant to population health, we may simplify the exposition by focusing on medical agencies. Since about 1900, these have been science-based even though many traditional customs, such as requiring couples to marry before having children or consumption taboos, are still followed in ethnic subcommunities. Once institutionalized, health organizations develop a great deal of autonomy that must be taken into account in constructing a prediction equation that links their efforts to improved health.

These definitions suggest the simple but untestable hypothesis that transaction organizations determine the level of population health for a given community level. That is, $ph = o$. The proposition is simple because it focuses on only one category of community structure, the dedicated organizations. It is untestable because we have no rule for deciding which transaction agency contributes to enhanced population health. The conventional wisdom is that medical facilities make a major contribution, but that ignores the firms and factories that provide jobs that generate the incomes that sustain material life or the cultural organizations that serve nonmaterial needs. Complicating matters is their constant adjustment in response to a changing environment, a condition that further undermines testability. Michod (1999:201) makes the same point with respect to natural selection of mutations.

Transaction organizations (also, “agencies”) are dedicated problem-solving organizations that are “on call” when the residents recognize a “problem.” Working through their local governments, residents discuss and classify the threat, review the available agencies and assign the task of “solving” it to the most appropriate agency. A small community may have to call on the resources of a larger place, and some problems, such as the loss of a major employer, may involve all levels.

Although it is sometimes possible to measure agencies, using them as a term in the prediction equation for population health involves at least two problems. The first is defining the boundaries of the descriptive categories. Should police departments be classified as “health agencies” that contribute to population health

levels? What about accurate statistical services or recreational facilities? In fact, any agency can make a significant contribution to maintaining population health if it can solve problems that threaten the community. That possibility suggests a wide search and the construction of broadly based indexes.

The second problem is the difficulty of assessing agency efficacy. If an intervention, such as a safe sex campaign, has no effect on its target population, there is no use including it in an analysis of population health. But the assessment of efficacy is difficult at best. For now, we must assume that if the clinics, hospitals or separate aspects of medical technology persist for a decade or more, they are probably effective in some respect. It is well to remember, also, that agencies do not solve many problems; they simply work on them. Sometimes they side-step or obfuscate them. In fact, their "problem-solving" may not get further than simply recognizing problems.

EXISTENTIAL THREATS

In his still pertinent book *Plagues and Peoples*, McNeill (1976) classifies environmental threats as "macroparasitism," by which he means warfare and raiding, and "microparasitism," the mass of microorganisms that may cause disease. From the perspective of human history, raids, massacres and slavery on the one hand and epidemics of disease on the other are certainly the principal environmental threats. But recent history is more a matter of the impacts of economic change. Some accounts (i.e. Molnar and Molnar, 2000) amend McNeill's binary classification by adding the negative impact of economic development and urbanization.

Everyone is familiar with the dislocations, conflicts, disorder and tyrannies that occur at one or more levels of community and impinge on daily life. Nation-states initiate wars, mismanage the economy or fail to prevent an epidemic. At the regional level, one sees plant closings and shifts in the resource base, along with depopulation and ethnic conflict. At the local level, small-time tyrants hold office, and gangs of young men roam neighborhoods. Families manifest smaller versions of these, from authoritarian parents to "broken homes." These potential threats may be short-term or long-term threats, but it seems doubtful that short-term threats are powerful enough to affect the trend of death rates, even if they sometimes produce a sharp spike in the graph line. Therefore, the search for significant threats should look for those that are likely to last a generation or more.

Problem-solving can occur only if the problem is publicly recognized. That is why regional economic shifts based on a new technology or new government regulations and their analogs in the global economy are better candidates for the prediction equations than soil erosion or a gradual increase in the scale of manufacturing. The interpretation of environmental threats varies with the size and level of the community. At the regional level, poverty may look like stagnation that calls for a governmental response, but at the family level it tends to take the form of constant uncertainty. Likewise, the income inequality of a unit as large as a county is often invisible to residents until it becomes associated with an excluded minority, such as the African-Americans. Then it may be recognized as a problem.

The identification of significant (enough to affect mortality rates) threats to a community is a matter of trial and error. Once a threat has been identified, it

is important to ascertain its disruptive effect on the different community levels: household, neighborhood, or province. Then problem-solving capacity becomes crucial. Lists of problems can be endless because each conventionally named problem is open to infinite division. But a number of generalizations can be extracted from common knowledge. First, although each level of community has its characteristic problems (and advantages), the subordinate levels often suffer the fallout from superordinate problems. There is always, it seems, “something coming down.” The structure of subordinate communities protects against some but not all of these unwanted and disruptive side effects. Only superordinate communities can protect them from even worse disruptions.

The proliferation of transaction agencies at all community levels that are dedicated to protecting the population from specific threats is a major development in the modern world and one reason why subordinate communities can feel secure even when an epidemic or an economic depression threatens. The agencies designated to counter particular threats may not be successful, but at least one or more agency is addressing the problem. This knowledge is particularly important to families because when the superordinate social organization collapses, families are left to protect their members as best they can.

The transient character of threats and responses accounts for the profusion of themes that run through the threat literature. At the individual level, researchers have inventoried acute and chronic life events and situations, classified them as negative or positive, looked into “hassles” and “uplifts” and examined whether the same family and friends have experienced the particular stressors (Turner, Wheaton and Lloyd, 1995). The “response” literature is somewhat better organized because some concepts such as “coping,” mastery, self-esteem, self-efficacy and the like have won acceptance at the individual level. Structural theory accepts the conventional inventory approach and expands it to community levels. What it does not accept are the theoretical claims that researchers make on behalf of these ad hoc indexes.

THREE STRUCTURAL DIMENSIONS

Three formal institutional patterns define the community’s capacity for general problem-solving. These master strategies that have evolved over millennia are structural differentiation, pluralism and solidarity. The first refers to the institutionalized capacity for applying specialized knowledge to a problem. The second is the open political contestation that may improve policy choices, and the third contributes by reorienting the community so that problem-solving can proceed in a different direction. The form that the third strategy typically takes is a reform movement.

Structural differentiation is, of course, the social division of labor of classical theory, now harnessed to the task of understanding community adaptation. Empirically, it is the diversity of occupations and organizations in a community. Its contribution to problem-solving is to supply crucial distinctions and accumulated knowledge when a community faces a problem. General structural differentiation is particularly relevant when the dedicated agencies in a community prove inadequate.

Structural pluralism is institutionalized political conflict, everything from the formal deliberations of government to street protests. Insofar as the process

defines opposition and clarifies arguments about policy directions, it improves on the trial-and-error that characterizes much social activity. But it is a process that easily becomes disorganized, and when it does, problem-solving capacity may be weakened. Dahl (1971) explored contestation and introduced “polyarchy” as a label for what is here called pluralistic organization, but the research tradition most relevant to structural pluralism is the analysis of state politics that V.O. Key Jr. (1951) initiated. Key argued that “inter-party competition” (which he contrasted with the pervasive patron-client politics in the American South) increased the chances of redistributive policies that benefited the poor. The opposition party could appeal to poor voters in order to change government. Key’s core ideas have been elaborated by his followers (reviewed in Cnudde and McCrone, 1969; Dawson and Robinson, 1963; and Hofferbert, 1974), and the basic mechanism has been generalized. Pluralism is now seen to be relevant to all kinds of policy directions.

Solidarity refers to the familiar process of mobilizing behind a leader and a “platform.” In its stable form of community pride and, at the national level, “nationalism,” it is widespread because many community tasks depend on concerted action. It is less frequent in its more dynamic form because mobilization often involves heavy personal and social costs and tends to be a last resort. Sometimes, however, a radical shift in perspective and a different ideology may be the only way to deal with an intractable problem.

All three of these strategies—applying specialized knowledge, considering alternative courses of action, and mobilizing behind a leader—depend on the natural language capacity of humans and they probably appeared with language. Communities attempt to solve problems by other general strategies, but differentiation, pluralism and mobilization are the most frequent. These three are also relevant when a community makes the initial assessment of a threat as a technical problem requiring specialized knowledge, a “political” problem, or as an existential threat.

ELABORATIONS OF THE MODEL

The components of the ecological model can be visualized with the help of a diagram, as in Figure 5.1. In this image, a given community level is depicted as a circle divided into two parts. In the left side are labels for the three structural dimensions, now phrased as activities. These contrast with the concrete organizations in the “transaction sector” which are grouped according to the conventional categories of production, exchange and medical. These in turn are linked to the outcomes of productivity, exchange and population health. At the left of the diagram is a list of examples of threats to the community. For purposes of this diagram, they are considered to be potentially manageable.

A number of questions can be raised immediately concerning the outcomes. Productivity is associated with factories and farming, but if a measure like GNP is used, the estimate encompasses all the activities that are marketized. Thus, productivity is a community-wide outcome and a useful criterion. But some countries still believe that territorial expansion is a measure of success. In reply, we note that territorial expansion is becoming less frequent in the modern world. Nation-states rarely take over the territory of other states and even annexations of

villages by expanding cities are infrequent. So this criterion can be omitted without serious loss. Another candidate is an index of intercommunity conflict. Such conflict at the subnational level is controlled in most countries by the national government, but that control is often weak. The larger point here is that outcome measures are consensus-based and therefore subject to change. Measures of population health can claim a more lasting acceptance.

A more fundamental criticism of Figure 5.1 is that it oriented toward smaller communities, such as the county, and omits the macro structures that appear at the national level. This omission was intentional because adding the many sectors to the diagram would have overcomplicated it, and they can be handled better in the text. Which macro structures should be listed? Government, the economy, science, religion and cultural transmission (education) immediately come to mind. After that, we would begin to encounter disagreement. Should medical knowledge and technology be kept separate from the rest of science? And what should we do with visual art and music? Do all the different components of conflict resolution—laws, courts, lawyers and the like—form a coherent complex? Or should we treat that as one of the many functions of government? That question also applies to financial and market institutions. The fundamental principle seems to be that a higher level of abstraction is associated with scale.

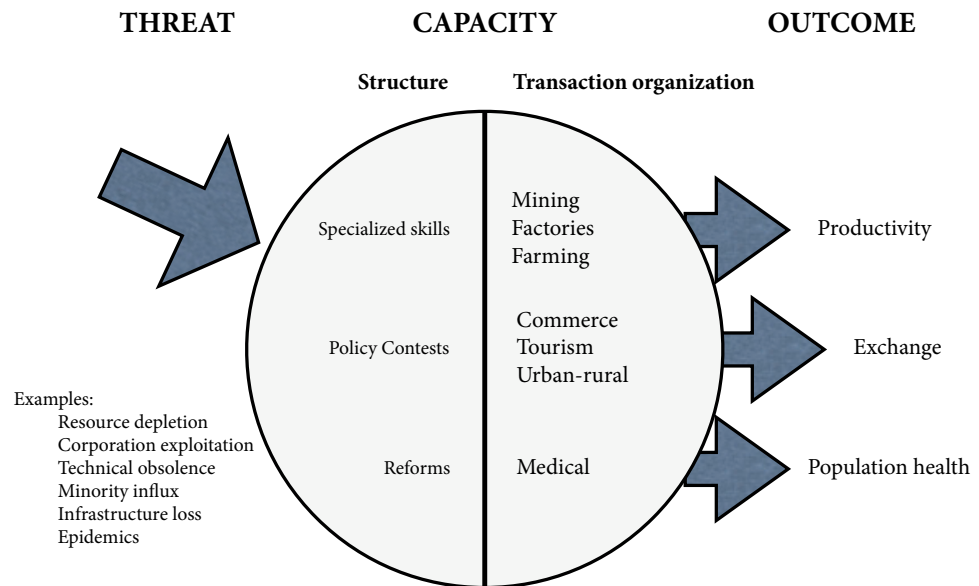


Figure 5.1 Diagram of the structural model of communities

Some of these institutional sectors have been recognized as “ideal types,” as illustrated by market organization, bureaucracy, democracy and the scientific method. These are the institutional complexes that have become stable over time and can now be measured with some accuracy. Each has a negative pole that reflects a lack of fit between structure and the environment. The efficiency of the dedicated organizations can be measured well enough with economic criteria, but that is less applicable to the macro patterns. For these, the all-purpose measure of adaptation is the family of population health measures.

What is still lacking in these formulations is a hypothesis that integrates threat with the capacity of communities to resist it and relates these to population health. In the present state of knowledge, a simple ratio can express that relationship. Thus $ph = C/t$ where C is one or more of the fundamental dimensions of problem-solving capacity and t is a measure of threat. As may be recalled from the discussion of capacity, C is defined as a structural dimension times a count of appropriate transaction organizations (S^*o) that has already been defined. The lower case letters refer to empirical indicators, while the upper case C refers to a theoretical derived concept.

Given the typical weakness of transaction organizations, even those like hospitals, clinics and doctors' offices, in the prediction of population health, capacity is mostly the strength of the three-dimensional structural profile. Thus, a sister equation is $ph=(D+P+S)$ where D is a measure of structural differentiation, P is structural pluralism and S is solidarity, especially mobilization for reform. If one or more transaction organizations are left in the equation, they must be multiplied by each of the structural dimensions. Alternatively, a "structural profile" can be constructed and used as a composite measure of structure. In practice, the three-dimensional profiles reduce to two or even one dimension because differentiation is usually dominant and typically overshadows pluralism. Mobilization, as its name suggests, is a temporary condition.

The operational framework of structural theory can be communicated by way of the variables that must be devised to test it. Table 5.1 lists these, beginning with composite scores for the three structural dimensions. They are followed by indicators of appropriate transaction agencies, holding medical organization separate. Such a list illustrates the possibility of computing interaction terms for each structural dimension and a broad spectrum of transaction agencies.

Table 5.1 Categories of variables needed for testing community ecology hypotheses at a given level of community

Structural differentiation composite score
Pluralism composite score
Solidarity composite score (infrequent because solidarity fluctuates)
Indicators of appropriate transaction agencies apart from medical facilities
Medical transaction organization(s), separated for detailed analysis
Interaction term for a structural measure and medical organization
Interaction term that uses an appropriate nonmedical organization
Environmental threat A (time and place specific, such as plant closings)
Environmental threat B (long term, such as regional decline)
A ratio interaction term that links measures of structure to threats
General controls on region of country, demographics or migration

Testing even a simplified version of this hypothesis would require a large sample and considerable exploratory research on appropriate measures. Very likely, tests would examine one structural dimension at a time and experiment with different measures of threats. Such measurement preliminaries are always necessary in research like this, but they are particularly required for threats which are consensus-based and vary with the region of the country. By contrast, the structural dimensions have a conceptual basis that guides the choice of indicators. The upper (e.g. C) and lower case (e.g. t) type shows this distinction, which becomes quite important in empirical work. The type-faces also highlight the hybrid character of the hypothesis, a feature that may be jarring to purists but is necessary for the prediction of population health.

THE INTERVENING ROLE OF HEALTH PRACTICES

At the individual level, transaction “organization” falls into two categories: practices that help a person deal with the general social and physical environment, and those that focus specifically on maintaining and defending the body. The latter are widely referred to as “health” practices and are crucial here because they serve as intervening variables in the structural explanation of health. Of course, calling them health practices begs the question. Science has not yet been able to show that all the many recommended practices actually improve health. And, in fact, many of them—habits of food consumption, physical movement, sleep, and so on—are traditional, maintained by a person’s ethnic group long before the science-based recommendations appeared. Nonetheless, “health practices,” along with “lifestyle,” is the currently favored term.

Many practices, habits and behaviors are socially visible, which exposes them to social regulation. In contrast, the immune system and the many microscopic pathogens that attack the body can only be identified with the aid of technology. For all practical purposes, they are socially invisible. This visible/invisible contrast

Table 5.2 A typology of health-related activities and physiological processes

	Molar	Segmental
Socially visible	Nutrient consumption	Consumption of non-nutrients
	Sleeping	Nutrition deficiencies
	Physical and mental activity	Genetic defects
	Elimination	Pharmaceuticals
	Sex and reproduction	
	Monitoring threats	
	Mobilizing for threats	
Socially invisible	Avoiding contact with pathogens	Immune system
	Consumption biases (high fiber, no meat, etc.)	Other systems
	Radiation exposure	

between customary practices and physiological reactions can be turned to advantage and used as one dimension of a typology. The second dimension is “molar,” affecting the body as a system, or as segmental, affecting one or a few organs or sites (at least initially). The typology in Table 5.2 illustrates these contrasts. It uses categories of activities but health-related practices are implied.

In the first quadrant, the list of socially visible molar activities includes the accepted body maintenance functions plus two more: monitoring possible threats and mobilizing to meet them.

The additional practices describe two components of most definitions of “stress,” a term that has now acquired multiple meanings (Wheaton, 1996). The emphasis here is on a person’s conscious defenses, perception of threats and moving against them. The typology does not consider the source of threats or their physiological correlates.

The placement of mental activity in this first column stretches the conventional meaning of that term because it is assumed that such activity generates visible actions, even if they are no more than twitches, ticks or peculiarities of speech. A different kind of classification problem appears with non-nutrients such as tobacco and other controlled substances. Accurate classification depends on whether physiological research can show that after any initial molar effects, the substance frequently targets a particular organ. If not, the item would have to be moved to the first column.

The behaviors that may be associated with the categories in the second quadrant are more specific and are virtually unlimited in their variety. The examples in the typology reflect a gradient of “perniciousness.” Drugs and tobacco appear to be harmful to the body even in small quantities, but the health consequences of genetic differences vary widely. Nutritional deficiencies may require considerable time to affect the body. Finally, although the medicines that doctors prescribe are usually benign, they sometimes have adverse side-effects.

The third quadrant lists some of the many invisible and segmented systems that maintain the body. These are described in physiology textbooks and linked to health by multiple pathways. A recent article by McEwen and Seeman (1999) reviews many of the current debates. In the fourth quadrant, avoiding contact with pathogens, directly or by blocking the carriers, is first on the list. Its molar character is reflected in the varied avoidance practices that people employ. Indeed, habits of interpersonal contact and avoidance are integral to a person’s style of life even though they are often unconscious or masked. Avoiding germs by bathing and hand-washing typically occurs in segregated rooms but, like elimination, these are socially regulated and therefore indirectly visible. Categories like these are admittedly ambiguous and may qualify as first-quadrant activities. Consumption biases, such as fast food, are different from nutritional deficiencies in that the latter are quite specific and usually show up as symptoms. Food biases, in contrast, may not be recognized (barring exceptions like vocal vegetarians) until a professional calls attention to them. The last item is radiation and similar exposures. They are molar, but their assessment of bodily harm requires medical technology.

Despite the many ambiguities in this typology, it illustrates a broad contrast between the intervening mechanisms that the biomedical and ecological models invoke. The first is physiological while the second is behavioral. The first points

to the immune system and the external control of pathogens as defenses, while the second suggests “moderated health practices” and the management of threats to communities. Physiologists have a comprehensive picture of how the R/T defends the body, but understanding is less developed with respect to the behavioral practices that may impact on vitality.

Social epidemiologists do not accept this contrast between the physiology of disease and the sociology of vitality. They recognize a role for social factors, mostly those like SES and social support that work at the individual level, and the literature makes reference to communities. But from the perspective of social ecology, the resulting hybrid is not coherent. As argued earlier, the social factors are effect modifiers of the resistance/pathogen threat ratio, yet this feature of the model is not recognized. More serious is the way the hypothesized causal sequence is construed, without much recognition of the intellectual background, as a variant of the “individual in society” perspective that dominated sociology during the 1950s when these theorists were trained. Without attempting to review the many problems in this paradigm, social ecologists would simply claim that the multilevel framework is an improvement. They might add that the multilevel statistics that social epidemiologists use with strong effect in empirical studies reflects this new paradigm even though the theory has not yet been accepted.

It may be objected at this point that even the “moderate” and “extreme” practices that mediate the ecological theory mix theories because practices are a part of the biomedical model and certainly involve physiology. That is true but this conceptualization is different. Health practices have both a social and a physiological aspect, which is why they are so important in the biosocial “translation,” but the physiological component does not automatically move them to the biomedical model. Their role in the ecological model turns on the variability of various sets of health habits rather than the links of selected practices to disease as required by the biomedical model. In that model, they are ad hoc additions whenever empirical research identifies a risk factor. Structural theory integrates a wide assortment of practices and emphasizes the way moderation affects the molar process of bodily maintenance (see Young, 2005).

THE INDIVIDUAL IN STRUCTURAL THEORY

As noted, the dominant format in social epidemiology for analyzing the impact of social factors on health is “the individual in society” paradigm that Durkheim utilized in his work on suicide in 1897. It continues today under the label of “social determinants” in social epidemiology. The Durkheim tradition actually begins with Tocqueville (1945; 1840), who assigned a preeminent role to voluntary associations in his account of early 19th century America. Although he was mainly concerned with their contribution to community-building and performance, he also saw them as small “societies” and summed up their impact with the statement: “Feelings and opinions are recruited, the heart is enlarged, and the human mind is developed only by the reciprocal influence of men upon one another” (117).

It is unlikely that Tocqueville was referring to all kinds of social interaction. Given the general thrust of his writings, he was probably thinking of participation in democratic contexts, especially voluntary associations, which he considered to

be mini-democracies. Thus, the Tocqueville hypothesis could be rephrased as the greater the participation in democratic social contexts, the healthier people will be. Expanded that way, Tocqueville's hypothesis would explain the findings of the eight prospective studies reviewed in Chapter 2 that reported correlations between participation in clubs or associations and health.

But how could participation in voluntary associations for a few hours a week affect a person's health? This doubt about the impact of participation raises the question of whether voluntary organization is the true locus of causality. Perhaps such participation is a proxy for a broader context such as a neighborhood or an ethnic group. Indeed, Tocqueville (1945:115) implicitly recognized this possibility in his explanation of the multiplicity of associations in America. He argued that they were an integral component of the more general democratic context that he contrasted with "aristocratic" societies, such as his own native France (see Eberts and Witton, 1970). In aristocracies, nobles (and their retainers) undertake large projects such as road-building, education or the care of the sick. Lacking such strong central resources (especially in colonial America), democracies must depend on the voluntary organizations of ordinary people. True, the scope of voluntary organizations has narrowed in modern society, but they still show the strong influence of class and ethnicity. This interpretation points the way to the formulation of broad community-level dimensions that use voluntary associations as indicators. And that idea takes us back to Durkheim, who never doubted that "society" was the locus of causality.

Durkheim was familiar with Tocqueville's thought, of course, but he never made much of voluntary associations. The closest he came was to advocate the formation of professional organizations for the many occupational groups in modern society, seeing them as a link or sometimes a buffer between the individual and the larger society (Thompson, 1982: 22). Yet all types of organizations, from families to churches to work organizations, can be construed as buffers if one accepts the individual's attachment to "society" (read "nation-state") framework. This is the side of Durkheim that has been incorporated into the thesis that multiple roles enhance health, as in Moen, Dempster-McClain and Williams (1989).

Durkheim's clearest picture of social structure and its impact on the individual is contained in his study of suicide (1951), which postulates that "regulation" (roughly, norms that set limits on behavior) and "integration" (where individualism is moderated, as in Catholicism compared to the relative freedom of Protestantism) are the two fundamental dimensions of social organization. He then focused on the four poles of the resulting fatalistic-anomic/ altruistic-egoistic typology because those states represent the extreme social contexts that are conducive to suicide. In other words, suicide varies in a curvilinear manner with regulation and integration. Stated positively, suicide rates are lowest in moderately regulated societies, where social integration is medium high (see Pescosolido, 1994).

Structural sociologists believe that the stronger version of Durkheim's theory turns on structure, not attachment, yet he obviously believed that people are differentially involved in society. They are attached via taxes, voting, reading newspapers, attending community ceremonies and similar rituals and duties. Eventually researchers will construct measures of degrees of "citizenship." Meanwhile, the structural framework acknowledges attachment as a secondary

variable that must be controlled. Like SES, with which it tends to correlate, it must be taken into account as an individual proxy for problem-solving capacity.

STRUCTURAL PROFILES AND NESTED HIERARCHIES

Two theoretical issues can only be flagged here. These are the construction of “profiles” and the interrelations of levels of community. Beginning with the profile problem, each of the three primordial dimensions (specialized knowledge, policy contestation and reform mobilization) may be linked to a particular transaction agency in predicting population health. At minimum, the combination of a structural dimension with an agency may generate three multiplicative terms, assuming appropriate transaction organizations. Future research should follow up on the other possible structural dimensions such as involution, totalitarianism, mystification, clientelism and their many combinations. But the problem at this point is how to construct profiles of the three most frequent structural dimensions.

All existing communities should show minimum levels of the three master strategies of adaptation, but their profiles will vary. To judge from the dominance of cities in the modern-nation state, we may assume that differentiation is pervasive. Much of the organization in cities is specialized. The second most frequent dimension is political contestation. Change of leadership and policy directions by means of elections, a major component of democracy, is the ideal, but stable forms of democracy are still less than universal. In the form of community spirit and cooperation, minimum levels of mobilization are widely distributed, but like democracy, their status is fragile. Nonetheless, such estimates of prevalence suggest a typical profile that looks like a staircase with three steps. Profiles vary around this typical profile but differentiation will probably remain dominant.

A discussion of community profiles leads logically to a consideration of the interrelations of community levels. These are usually spelled out in the legislation that defines them; for example, the expectation that superordinate communities will provide assistance in defending against outside attacks and catastrophes. Subordinate levels are responsible for local-level security and welfare, but in addition, they supply money and personnel to superordinate levels in the form of taxes and recruits for the military and the bureaucracies. The problem with these legally defined functions is that the actual exchanges are sporadic and therefore difficult to measure. Even so, it should be possible to assess the relative influence that particular communities among those at a given level (the richest counties in that category, for instance) seem to have.

CHAPTER 6 **STRUCTURAL PLURALISM AND SOCIAL MOBILIZATION**

Pluralism is only one of the three general problem-solving dimensions, but it deserves separate treatment because it breaks new conceptual ground and reflects a surge of new research. It is important for structural theory because it illustrates, in a manner that diverges from the conventional wisdom among social epidemiologists, the way problem-solving works. In particular, the pluralism concept implies a different perspective on voluntary associations. They are still considered microcosms of democracy and one of several important contexts for learning social problem-solving, but when they are used to measure the structure of communities, they are best interpreted as capacity for social contestation. They reflect a core process of democracy, not a particular kind of social psychological outcome (i.e. trust, cooperation, etc.).

This chapter also examines solidarity and social mobilization because structural theory uses a definition that diverges sharply from the “social cohesion” that much current research uses. The two concepts are related, but structural theory downplays the “social support” that is central to the cohesion concept in favor of the problem-solving role that solidarity/social mobilization plays in a theory of community adaptation. The other dimension, structural differentiation (i.e. the social division of labor), is amply illustrated in the research examples and needs little further conceptual elaboration.

STRUCTURAL PLURALISM AND SOCIAL CAPITAL

Structural pluralism is the degree to which organizations and population segments of a community engage in political competition. As used here, this concept is broader than competition among political parties because it includes everything from legislative debate to the proliferation of clubs and associations that embody diverse interests. As mentioned earlier, this focus on competitive exchange draws on the work of V.O. Key Jr. (1951), who initiated the study of “interparty competition” in the American states. He and his followers explored the proposition that competing parties are more likely to pass redistributive legislation because the party out of power can (sometimes) mobilize the votes of the marginalized groups and threaten an upset. Likewise, interparty competition improves the performance of government agencies by institutionalizing public criticism.

Structural pluralism is the community’s potential for organizing both support for and opposition to policies. Low pluralism implies apathy, which is sometimes reinforced by an oligarchy or a strong man who enforces passivity. The definition also distinguishes contestation from the use of “pluralistic” to describe multi-ethnic communities. Such communities typically manifest rigid internal boundaries for the ethnic identities and generate conflict that is at best a precursor of structural pluralism. As defined here, structural pluralism is as old as human groups. Even the most primitive communities had to make (and debate) decisions about hunting, migration and raiding. Custom and mythology maintained the accumulated

wisdom, but it was continually modified as conditions changed. From time to time a social movement erupted that changed the whole community, after which contestation continued within the new framework. As used by modern communities, structural pluralism is an advantageous social mechanism for evaluating policies in advance, before the community commits its resources.

A concept that contrasts with structural pluralism is “social capital.” As defined by Putnam (2000), it refers to “connections among individuals—social networks and the norms of reciprocity and trustworthiness that arise from them” (2000:19). Social capital links “civic engagement” (newspaper reading, membership in clubs and associations, etc.) to the improved community institutions that foster better health. According to Putnam, these informal social affiliations work their “magic” in three ways. Social capital “allows citizens to resolve collective problems because socially connected people are more likely to cooperate in order to resolve a problem.” Second, it “greases the wheels that allow communities to advance smoothly.” As the economists would say, it reduces “transaction costs.” And third, social capital “improves our lot...by widening our awareness of the many ways in which our fates are linked.” He adds that people who are connected are more likely to be community-oriented instead of being “swayed by their worst impulses” (2000:288-289). Putnam acknowledges that people cooperate to rob banks, discriminate against minorities, and attempt to advance their “worst impulses” in other ways, but he believes that the good outweighs the bad and that subsequent research will clarify these issues.

Skocpol and Fiorina (1999:13) characterize Putnam’s use of the social capital concept as “neo-Durkheimian” because his emphasis on face-to-face interaction and social trust aligns with at least one version of that well-known French perspective. The defining features of his neo-Durkheimian approach are cooperative social action and the socialization of individuals into the norms that support it. It is significant that Putnam drew on Almond and Verba’s (1989/1963) study of “civic culture” as a principal source, even though he must have been familiar with the work of V. O. Key, Jr. (1951) as codified by Dawson and Robinson (1963). The initial research in the V. O. Key tradition was disappointing, but a strategy that broadened the concept and measures in the direction of state-wide pluralism succeeded (R. Young, Rolleston and Geisler, 1984). The pluralism concept used here draws on the latter because it better interprets the political diversity in communities and is not burdened by the difficult task of explaining how social cohesion can be measured with Putnam-type variables.

Popular though it is, this chapter puts aside the whole Putnam corpus. Putnam’s version of the social capital concept is subsumed by structural solidarity, and most social capital measures are aggregations of individual behaviors that do not meet structural criteria for adequate measurement. Social capital is better conceptualized as an aspect of solidarity that it is automatically generated when people coordinate their actions toward a larger goal. The indicators of trust and close personal ties are secondary features of mobilization.

CALDWELL’S PIONEERING CONTRIBUTION

On the basis of field studies in Africa and South Asia, Caldwell (1986; 1993) has elaborated the role of political democracy, of which structural pluralism is

a principal component. His perspective can be understood as a reaction to the “economic development” perspective and to the version of the biomedical theory that is embedded in that theory. Caldwell’s most radical break with previous thinking is his stress on macrosocial determinants. Summing up, he says that the three exceptionally low mortality countries that he analyses “show a substantial degree of female autonomy, a dedication to education, an open political system, a largely civilian society without a rigid class structure, a history of egalitarianism and radicalism and of national consensus arising from political contest with marked elements of populism” (1986: 182). He goes on to say that “We have concentrated... on open societies and have shown how...successive elections resulted in electors demanding educational and health services and in competing political parties offering to provide such services” (207).

Structural theory would accept the general Caldwell picture of what is here called pluralism, but it would add a number of features. First, it invokes “institutionalized problem-solving capacity” as a principle of interpretation for all three structural dimensions. Second, it assigns only a secondary role to the medical technology that Caldwell emphasizes, arguing that structure is a stronger and more comprehensive cause. And third, it introduces an additional intervening mechanism—health practices/biological optimization that “converts” structure to population health.

As noted in Chapter 4, Caldwell introduced the term “autonomy” to summarize the personality development in women that helps them protect their own health and that of their families. Autonomy is solidarity writ small, as it must be at the individual level. But structural theory claims that there is another component in this process: the child’s participation in a problem-solving household. That additional hypothesis would account for Caldwell’s observation that the education gradient holds even in districts cut off from modern medicine. He leaves no doubt, however, that the mothers must provide a great deal of health care.

PLURALISM AND POPULATION HEALTH

The number of association memberships per capita is often used as a measure of social cohesion. But it is difficult to see how the members of clubs and associations, representing ethnic and socioeconomic subcommunities as they do, could generate the social harmony that the social cohesion concept implies. It is more reasonable to expect them to be little islands of difference that are continually involved in the push and pull of politics. At any rate, that is the starting point of the Young and Lyson (2001) comparison of U.S. counties that introduced the concept of structural pluralism as an alternative to cohesion.

In the U.S., the proliferation of voluntary organizations and churches has been used to measure both cohesion and pluralism. The curve of increased church membership as a percentage of the population rose from approximately 40 percent in 1900 to 70 percent in 1998 (Caplow, Hicks and Wattenberg, 2001:107). This rise in membership was accompanied by a comparable increase in the number of denominations. Putnam documents a similar but shorter trend line for the average membership of 32 voluntary organizations. The curve for his composite measure rises steeply from 1900 to 1930, dips during the Great Depression and then rises again to 1960. From then on it declines sharply to a point midway between the low

for 1900 and the high for 1960 (Putnam, 2000:53 ff.).

Putnam's graph does not support his argument because he finds that a key indicator of "social capital" has declined since 1960 but life expectancy has been increasing fairly steadily throughout the century. This contradiction arises because Putnam's list is confined to "chapter-based" organizations, those that provide face-to-face contact in the local community. He excludes the vast expansion of "citizen" or "interest groups" that have superseded the chapter-based organizations on the grounds that they are simply "checkbook organizations" and could not be related to life expectancy. But both Berry (1999) and Skocpol (1999) believe that these organizations, especially those that lobby for the environment, are a new force in American politics. More to the point, they are preferable indicators of stronger pluralism at the national level.

The units for the Young and Lyson (2001) analysis were the 3,000 plus counties of the contiguous U.S. states circa 1990. Structural pluralism was measured by a factor score that summarized the relationships among indicators of interaction venues. The items may be briefly described as a count (standardized by population) of all voluntary associations in the county (loading .58); of "membership" organizations such as trade unions and professional organizations (.70); and small businesses, such as bars and barbershops, that provide interaction opportunities (.76). Additionally, we included the percent who voted in the national elections (.74). The last variable is an aggregation of individual acts and is not strictly speaking a structural indicator, but it serves to validate our index against a well-known measure of political competition. The availability of medical facilities is measured by physicians per 10,000 and hospital beds per 100,000 population. These two measures probably reflect the concentration of other kinds of medical facilities.

The principal result of this study as summarized in Table 6.1 is that structural pluralism is a significant predictor of lower age-adjusted mortality, stronger even than median income or education. Hospital beds per 100,000 has no effect on mortality, while the effect of doctors per 1,000 is positive, contrary to expectations. This well-known spurious correlation was explained in Chapter 3.

Table 6.1 Regression analysis of age-adjusted mortality in U.S. counties

Predictor	Coefficient
Structural pluralism	-0.40*
Median family income, 1989	-0.20*
Median years schooling	-0.23*
Physicians/10000 (log)	0.21*
Hospital beds/ 100,000 (log)	0.01
Adjusted R ²	0.37

*= standardized coefficient is significant at the .05 level or better. For the definition of pluralism, see text. Source: Young and Lyson (2001).

It is remarkable that structural pluralism should have such a strong effect on mortality. At first glance, the association is improbable if, as argued above, the composite index reflects divergent interests and even conflict. Although problem-solving organization, and pluralism in particular, has been an increasingly important

aspect of human survival ever since the advent of speech, it is hard to credit this variable with more power than income and schooling. It is possible that the pluralism factor has picked up some of the individual-level participation in clubs and politics, but why should such social participation predict lower mortality? One answer is that, at the individual level, participation in associations is equivalent to sharing in solidarity. As already noted, clubs often function as mobilization vehicles for ethnic and class segments. But either way, as competitive units at the county level or as solidary contexts for individuals, it is a powerful predictor, on a par with SES.

In a comparative study of nations, Frey and Al-Roumi (1999) have indirectly tested the pluralism hypothesis by showing that political democracy predicts life expectancy after the first year of life. They reviewed the literature and found that six of the eight cross-national studies reported a positive relationship of democracy with an index that combined life expectancy and infant mortality. For their measure of democracy, Frey and Al-Roumi used Gastil's (1990) ratings of political rights (11 items beginning with "chief authority elected by a meaningful process") and of political liberties (14 items beginning with "media free of political censorship") for their measure of democracy. For economic development, they used the log of energy consumption (standardized by population); for the impact of the state, government expenditures as a percent of GDP; and for rapid population growth, the percent change over the appropriate decades. With these variables and cross-sectional regression analyses of 87 countries, they found that democracy and development consistently predicted improved population health. This is a solid demonstration of the power of pluralism, and it also ratifies the well-known association of economic development and population health.

Cross-national comparisons throw light on historical trends such as the increase in life expectancy in England and Europe since the 19th century and almost everywhere since 1950 (Riley, 2001). In a provocative essay, Wilkinson (1996) asks "What is driving the long-term rise in life expectancy?" After rejecting the increase in GNP, education, medical care and healthy life styles, he calls our attention to the deleterious effects of income differences. Inequalities in income generate psychosocial pathways that reduce health. Is it then the reduction of income inequality that is the cause of the secular improvement? Recent democracies probably have less inequality than earlier kingdoms and dictatorships, but there is still a great deal of polarization. Moreover, the psychological pathways (e. g. feelings of relative deprivation) require personal observation of inequality which is unlikely in large communities. As one seminar wit remarked, one of the few places where this hypothesis holds is in an academic department where professors are jealous of each other's salaries.

A more plausible hypothesis is that the spread of democracy since 1900 and especially after 1950 has improved population health. Huntington (1991) refers to the democracies that have appeared since 1975 (when Portugal shook off its dictatorship) as the "third wave," but even before these, the independence movements that began about 1940 introduced significant increases in structural pluralism. This movement is, according to structural theory, the fundamental cause of the historic increase in life expectancy since 1950.

WOMEN'S STATUS AND POPULATION HEALTH

Caldwell must be credited with calling attention to the powerful effect of mothers' education on the health of children, and his descriptions of democratic Costa Rica and Kerala (India) emphasized the strong role of women in those societies. Structural theory takes women's status as a sensitive indicator of pluralism, because the pluralism concept implies the increased participation of excluded population segments like this.

Thus, in a pioneering study of mortality in 43 mostly developed countries over the period 1900-1964, Preston (1976) measured and analyzed women's status in relation to mortality. He found it to be the strongest predictor of male and female mortality in comparison with the percent in agriculture and the percent living in large cities. His measure of women's status was based on the ratio of female attainment to total female labor force. Using this measure, he found that the higher the discrimination, the higher the death rate for both men and women.

Kawachi et al. (1999) report strong associations between their measures of women's status and both male and female mortality in a comparison of the 50 US states. They measured women's status with indices of political participation, economic autonomy, employment and earnings, and reproductive rights. With their many institutional items, these four composite indices are true structural measures, not simply aggregated behavioral characteristics. Consequently their finding that women's status predicts lower mortality for both sexes is probably a true group effect. Kawachi et al. explain this result by invoking a partial structural interpretation: states with high gender inequality tend to be unequal in other respects and these affect both male and female mortality.

The one index in the Kawachi et al. study that did not predict was reproductive rights. Yet such legal support is precisely what should have predicted lower female mortality. An index composed of laws which ensure access to abortion services, public funding of infertility treatments, maternity stay, a pro-choice legislature and/or governor, adoption permitted by gay/lesbian couples and the like should reflect the kind of egalitarian social structure that "gender inequality theory" points to. The weakness of this index is that it focuses on one half of the adult population, rather than to the political process that benefits everyone. The failure of this index actually supports the structural interpretation.

A study by the present author (Young, 2001b) used the data on women's status on 152 countries from the Human Development Report 1999 (United Nations Development Program, 1999) to explore women's status at the national level. In line with the structural claim that women's status is a reflection of pluralism that increases population health for both sexes, the study used male and female life expectancy and infant mortality as criteria. A factor analysis generated three composite measures, development, women's status, and medical personnel. Most of the indicators of development are conventional, even though measures of calories per capita and immunization are not usually grouped with GNP and energy consumption. The one indicator with a negative loading—a high proportion of women in the labor force—is best interpreted as an indicator of poverty, not liberation.

The women's status factor measures women's attainments against those of men via the percent of women in important occupational categories—administration,

professional, government and seats in parliament—and also the ratio of male to female literacy. The latter is substantively different from the other component variables, but it is a traditional measure of women's status. Regression analysis showed that both development and pluralism (proxied by the women's status factor) predicted both male and female life expectancy, and they continued to do so even when a country's location in Africa, a powerful negative factor, was included in the equation. Medical personnel was significant only in the prediction of women's life expectancy.

SOCIAL MOBILIZATION

Over the last several decades the study of social movements and social mobilization has progressed rapidly, and sociology textbooks that do not discuss social movements are now considered deficient. However, their role in social organization is open to multiple interpretations. At the least, they operate as ad hoc lobbies for causes that lack the resources to hire professional advocates, calling attention to injustice or wrongdoing that would otherwise go unnoticed. In larger communities and across regions, they press for structural change, as happened during the U.S. populist movement of the 1880's and the workers union movement before that. And, of course, they can aim at a global impact, as the democracy movement aspires to. Thus, social movements are organizations that attempt to bring about social change. Structural ecology accepts this interpretation but goes further in claiming that mobilization is the master strategy of last resort. When specialized knowledge and policy debates prove inadequate, social movements may appear that promise another way out of a threatening or unbearable situation.

Social movements enhance population health because, if they are successful, they contribute increments of specialized knowledge to the community stock. Every formal organization and agency in a community began somewhere as a local movement or a spinoff from a larger one. The same is true for the components of what we now call democracy. But in addition to putting health-relevant organizations in place, mobilization has a direct effect. Such goal-directed cooperation is energizing and mentally stimulating. It increases vitality. It is difficult to accumulate systematic evidence for this "solidarity effect," but persuasive trends and case material exists.

Consider, for example, the dramatic increase mentioned earlier (in male life expectancy in Great Britain from 40.5 in 1861 to over 70 in 1961 (Winter 1982;100). But his review of European historical studies concludes that the debates on the causes of such mortality decline were "inconclusive." Nutritional improvements, the interaction of nutrition and resistance to infectious disease, medical interventions, public health technology, the increase in government supervision of health, and cradle-to-grave health care at public expense are examples of the many factors that have been explored and found wanting. All of these proposals have one thing in common: they are consistent with the general biomedical model of health. In view of this loyalty to the biomedical model, and the absence of any alternative to it, it is not surprising that change in social organization is not on the list.

Nonetheless, the sociological argument is just as plausible as the biomedical explanation. It is supported by broad empirical trends and offers a more coherent counter-explanation. The second half of the 19th century saw the apogee of the

British Empire. Most citizens were aware that they were participants in a national expansion that was a resounding success by the standards of the time. The “empire paradigm” showed that it could solve a wide range of problems in the modern world, and the strains and doubts of two world wars had not yet undermined that promise. Along with this new version of nationalism were improvements in parliamentary democracy and the specialized services of expanding cities.

In addition to national development, there was a noteworthy sectional trend. Working people embraced unionization and used it against employers to make gains that improved health. Over the long term, it created communities out of previously atomized workers. Cole’s (1925/1948) history of the working-class movement shows a rising graph line for membership in trade unions during 1900-1945. The trend is sharply upward from 1900 to 1920, then slumps during the interwar period, rising again to a peak about 1943. Cole explains the upward trend as the successful consequence of worker agitation that brought about trade union acceptance by 1920. Earlier, the 19th century saw the rise of the Friendly Societies and the Cooperative Movement. All of these, according to Cole, embodied the principle of self-help and a local form of mobilization that could be applied to all aspects of life, not just work. These organizations quickly adapted to urban life. Their codified rules and formal governance allowed them to spread beyond the early village context where cooperation depended on family and personal relations.

Taken as a whole, these working-class organizations significantly enlarged the national capacity for pluralism. Every local union was a miniature debating society and a potential base for divergent views on national political directions, as Rueschemeyer, Stephens and Stephens (1992) observe in their detailed case study of Great Britain. Working-class organizations contributed to life expectancy at two levels. They effectively formed communities of workers from different factories. Although the problem-solving profiles of the working class varied, the workers had achieved an advance over the relative disorganization of the peasants. Community organization now had more substance, and the residents benefited accordingly. Once that happened, a second process unfolded as these new organizations moved their memberships into national politics.

In another report Winter (1986) analyzed a striking health effect of civilian support of warfare. The British civilian mobilization during both World Wars I and II was associated with a marked increase in life expectancy. His graph lines leave no doubt about the effect, and Sen’s (2001:342) commentary emphasizes the increased mutual support during crises. There are other possible explanations, of course, and improved diet as a consequence of rationing is an obvious one. Future studies must control on these if the sociological hypothesis is to stand.

The U.S. study of black Americans (Cooper, Steinhauer, Schatzkin and Miller, 1981) that linked Sixties experience with improved health reported a 25 percent decrease in black adult mortality during the period 1968-78. The authors attribute this drop to improved hypertension detection and control fostered by the civil rights demand for better access to medical facilities.

These studies found rough correlations between macrosocial events and mortality, and then made the ex post facto interpretation that the social “variables” caused the changes in population health. That design poses problems of interpretation, but a

study by Whitbeck, McMorris, Hoyt et al. (2002) posed the opposite problem: how to connect responses measured at the individual level to the amorphous impact of a social movement. Their survey of depressive symptoms among Native Americans suggested the hypothesis that “being strongly grounded in one’s culture may buffer against the stress of being considered an outsider by the majority culture” (p. 403); in other words, an interaction of cultural participation and the stress of exclusion. Assuming that the practices (participating in powwow, knowledge of tribal language, and engaging in traditional activities) are associated with the cultural renewal movement of recent decades and that discrimination against Native Americans can be classified as an external threat, Whitbeck’s study foreshadows the basic components of the model proposed here.

SOCIAL ACTIVISM IN AMERICAN INDIAN TRIBES

The “mobilization/cohesion group effect” (on individuals) hypothesis was articulated more than a century ago by the French sociologists, Tocqueville and after him Durkheim, and it is widely accepted. However, the strong social movements that are required to affect population health are infrequent and do not lend themselves to rigorous research designs. An exception is the “Sixties” movement. It can be tested with the data from the Native American tribes.

The activism-health relationship, as this version of the general hypothesis may be called, is particularly relevant to the Native-American groups because the segregation and discrimination inherent in the reservation system can be identified as a cause of much of the health deficit that this minority suffers. Cultural renewal combined with protest mobilization is one of the few strategies that promises to redress the situation. As it happens, we have usable records of the tribes that engaged in activism during this period, and we also have the census aggregated self-reports of disability for the Native Americans who lived on the reservations as of 1990. True, we cannot match individuals with exposure, but that is not required when the community is the unit of analysis. What must be shown is that the collective attributes of reservation communities affected the rates of population health.

The sample for this study consists of all the reservation communities listed in the 1990 U.S. Census that had a large enough population (usually 1,000) of working-age people, that is, 16 to 64 years. This criterion insured the stability of disability rates, which use the labor force as a denominator. Despite the ten-year lag between the measurement year of the structural variables and 1990, when disability was recorded, this study is best considered a cross-sectional analysis. By 1990 nine percent of the work force claimed a “mobility” disability, while 10.7 claimed a work disability. The disability indicators reflect a growing problem in most welfare states, because assigning disability status (with the attendant financial support) can be a long-term substitute for unemployment insurance. More than that, the self-report may reflect the respondent’s judgment of his future health prospects. Just as the simple five-level self-rating scale of personal health has been shown to predict premature death (Idler and Benyamini, 1997), disability self-reports may augur equally serious outcomes.

The information on tribes in *Native America in the Twentieth Century* (1994) proved most complete among various sources, and consequently the search for data

was limited to this source for increased reliability. A naive coder classified aspects of cultural renewal present if explicit examples were given and/or the description included a general statement as to the occurrence of renewal during the 1960-90 period. This indicator of mobilization classified 21 tribes, or 35 percent of the sample, as having engaged in some type of cultural renewal. The encyclopedia mentioned another indicator of mobilization: claims against the government for the return of or compensation for lost lands and/or water rights. A lower proportion (22 percent) was classified as engaged in protests and/or litigation.

In an effort to sharpen the context for the two activism factors, I partitioned the sample by ecological context: the tribe-county units of the Southwest (Arizona and New Mexico, N=23) as contrasted with all others (N=37). This division of the sample along geographic-culture lines is a standard move when there is reason to believe that the analysis is weakened by opposing contexts.

Table 6.2 Regression analysis of disability in the Southwest sample N=23

Predictors	Mobility disability	Work disability
SES	-0.59*	-0.69*
Claims	-0.50*	-0.32
Renewal	-0.43*	-0.17
R ²	0.38	0.42

Numbers are regression coefficients. * =significant at the .05 level.

Table 6.2 shows that in addition to the familiar SES, both mobilization factors are significantly related to lower reported mobility disability while Claims predicts lower work disability ($p=.07$). But the signs of the nonsignificant coefficients are in the hypothesized direction, so this is about all one can ask from data such as this. Assuming replication, it shows the predictive power of solidarity even in competition with SES.

The larger implication of the activism/health hypothesis is its centrality to contemporary social epidemiology and the status of mobilization as one of three master strategies of adaptation in structural ecology theory. But expanding research in these directions poses difficult problems of empirical analysis. For the near future, we will have to depend on the evidence supplied by natural experiments such as this one.

THE BIG BANG(S) ORIGIN OF SOCIETY

Simply postulating the three master strategies—specialized knowledge, debating alternatives and mobilizing behind a reform—is a reasonable starting point for a theory. But such an abrupt beginning leaves many people unsatisfied, prompting the question of where the three strategies came from. It is not enough to say that they were embedded in language right from the start, because that does not explain why each one has evolved to its present state. A better question is to ask what caused the increments in these three strategies over centuries. Where did the new products, organizations and occupations of the division of labor come from? How

did improvements in the process of comparing policies arise? More specifically, what is the origin of town meetings, the expanded suffrage of women and African Americans? Turning to solidarity, why do we see the activities in legislatures and parliaments, as varied as they are, now regularly supplemented by marches, sit-ins, general strikes and promises of change by candidates for public office?

Many sociologists and most economists simply assume that innovations occur. A related perspective on innovation is social psychological because it assumes that individual attributes improve the capacity and/or the motivation of “entrepreneurs” to innovate. A third position, embedded in French sociology around 1900, claims that concrete innovations are “fall-out” from social movements. Structural theory draws on this Durkheimian position as set forth in *The Elementary Forms of the Religious Life* (1912/1954). Although he framed his explanation in religious terms, we recognize it as the process of social mobilization. Durkheim believed that social movements produced the concrete changes that structural theory would claim are incorporated into one or more of the three master strategies. He did not state his theory in these terms, of course, but it can be construed as accounting for increments in differentiation, pluralism, and the mechanisms for maintaining solidarity.

In Durkheim’s own words:

There are periods in history when, under the influence of some great collective shock, social interactions have become much more frequent and active. Men look to each other and assemble together more than ever. That general effervescence results which is characteristic of revolutionary or creative epochs. Now this greater activity results in a general stimulation of individual forces. Men see more and differently now than in normal times. Changes are not merely of shades and degrees; men become different (1954: 210).

The key indicator seems to be the shift in perception that movements create in the minds of at least some members of the community, stimulating them to innovate in concrete ways. The ritual interaction that is intrinsic to these “religious” movements maintains the tension and the expectation of change. If we assume that communities are under threat, then it is reasonable to expect the innovations to be relevant to it, but whether they contribute to the management of threat is unpredictable and requires a long wait in any case. One more assumption, borrowing from Kuhn’s (1970) conception of paradigm development in science as extraordinary innovation followed by “normal” puzzling-solving, is that innovations become institutionalized and contribute to larger clusters such as those formed by the three master strategies.

This fundamental process of change that structural theory proposes can be described by the biological concept of “punctuated equilibrium,” extending it to social movements and their multiple innovations followed by a long period of status quo continuity. The innovations that the movement generates tend to be similar to one another because they are responses to a common threat. But just because they are similar, they cannot all survive. So the “equilibrium” period involves a ruthless sorting-out process. The successful transaction organizations that become institutionalized are not necessarily those that will insure long-term community survival, given changing conditions, but they meet immediate needs. According to structural theory, such short-term successes are all that societies can expect.

CHAPTER 7 **STRONG AND WEAK COMMUNITIES**

Communities at every level can be weak or strong. Strong nation-states have stable governments, aggressively produce and sell products and spread their culture with an active foreign policy. At the other end of the scale, there are “failed states” where “tribalism” is rampant and leaders are corrupt. At the local level, “active” communities attract industries and talented people, they control crime and assimilate minorities. Weak communities seem unable to recover from a natural disaster or an economic slump and their leadership is a congeries of hostile factions. Members of weak families do not work together, the relations between spouses are unstable and the kids get into trouble. Strong families do things together, they contribute to the community, and their children are all “above average.” How can we explain the differences? And more fundamentally, how can we define strong and weak?

Since the beginning of the twentieth century and the acceptance of the gross national product as a yardstick for national economies, “economic strength” has dominated thinking about the capacity of larger communities. GNP and its variants did not answer the question of what constituted a strong economy, but economists were confident that they would find the mix of entrepreneurship, comparative advantage, trade and deregulation that generated continuing economic growth. But the very success of GNP provoked questions about its status. Was that the only criterion of “progress?” Some countries seemed to be satisfied with their traditional economies while others looked at the control of runaway population growth as the ultimate goal. Still others concentrated on their military prowess, especially with respect to their hostile neighbors.

The alternative to GNP that could not be ignored was the quality of the life. Economists themselves added “human capital” to their equations, and international agencies, including the World Bank, began reporting statistics on life expectancy, infant mortality and the prerequisites of health, such as access to clean water. Economists accepted these statistics as a useful supplement to GNP and proceeded to investigate the relationship between their master criterion and various measures of population health, confident that they could explain the latter by the former. Those studies are continuing, but it appears that even thinking about population health was insidious. It produced a silent revolution in thought about the strength of large and small communities. If population health is the final good, as seemed obvious to many researchers, what are the implications for conceptualizing strong and weak social organization? Surely there is more to it than production, trade and consumption. Yes, indeed, there are institutions, and these were placed at the heart of new thinking about economic progress. Those dissident economists who had been won over to the population health criteria looked to medical organizations as crucial.

Once the door to alternative criteria was opened, some surprising visitors appeared. One of these was Darwin’s metaphor of the randomly spreading bush, with each branch representing a successful adaptation, as evidenced by a span of

survival long enough to leave paleontological remains. But the environments of these survivors were all unique, so there could be no common denominator to cultures. At least among anthropologists, that apparent fact justified cultural relativism and the rejection of all criteria of progress and strength. In practice they substituted moral criteria that classified the Nazis of World War II as “bad” and most American Indian tribes of the previous century as “good.” Nonetheless, the Pandora’s box of cultural relativism and claims for unique adaptations had been opened.

As its contribution to this conceptual survival of the fittest, structural ecology offers a middle road, somewhere between the narrow view of economics and the relativist’s rejection of the possibility of a science of societies. It nominates population health as the universal criterion of adaptation while leaving a place for GNP and other yardsticks. As discussed in Chapter 1, there are problems with “ph” measures and the concept of population health, if for no other reason than that it departs from the Darwinian criterion of reproductive superiority, but it has many advantages for a general model. Structural theory then makes the strong claim that several master strategies of problem-solving capacity are fundamental to understanding what makes communities strong or weak. It relegates all the concrete organizations, agencies and institutions that constitute communities at all levels to the secondary status of “transaction organizations.” From the perspective of the residents, these organizations are both visible and indispensable. They are considered the basic building blocks of society. But structural ecology can handle these only as ad hoc entities, not subject to standardized measures or demands of general theory. In a word, structural ecology chooses the grammar over the many “conversations” that go on in communities.

RETELLING THE TALE OF TWO STATES

The tension between individual and group-based explanations that pervaded Durkheim’s work on suicide is amplified in recent empirical studies of strong and weak communities. One that argued for individual habits but is interpretable as structure is Victor Fuchs’ (1998) analysis of the contrast between the population health of Utah and Nevada. He noted that despite their similarity with respect to income, schooling, urbanization, climate and medical personnel, the death rates of the two states diverged. Nevada’s rate was substantially higher than Utah’s. What accounts for this difference? According to Fuchs (1998:53), “The answer surely lies in the different life-styles of the residents of the two states.” He then proceeds to enumerate the well-known contrasts between the stable, predominately Mormon residents of Utah and the restless risk-takers in Nevada. The list included the percent native born, changes in residence, marital status and, as a consequence of consumption habits, deaths from cirrhosis of the liver and lung cancer.

These contrasts still hold. As of 1998 the combined deaths from the two diseases for Nevada was 438 per 100,000 as compared to Utah’s 250. Similarly, Nevada has more suicides (23 versus Utah’s 16 per 100,000) and homicides (9.8 versus 3.0). Most of the other contrasts are reflected in Nevada’s persistently high rate of population change (a 45.4 percent increase in 1990-98 versus Utah’s 21.9 percent.) Fuchs also mentioned the higher infant mortality rate for Nevada, and we are able to replicate his analysis of that criterion using 1998 figures. Table 7.1 shows the rates for 1968, 1979 and 1998, broken down by race. With this refinement, it is possible to see that

the difference between the two states is partly due to the higher infant mortality of African Americans in Nevada. A similar breakdown for age-adjusted adult mortality reveals the higher death rates for both blacks and whites in Nevada. (The unexpected high of 1122 in Utah may be an artifact of the small numbers of blacks in this cell.)

Table 7.1 Vital statistics for Nevada and Utah, 1979-1998

Statistics	Nevada			Utah		
	1968	1979	1998	1968	1979	1998
Infant mortality, whites	25.5	10.0	6.0	16.6	10.5	5.7
Infant mortality, blacks	33.5	20.6	17.3	52.4	27.3	n.a.
Mortality*, whites		1066	983		919	785
Mortality, blacks		1305	1013		871	(1122)

*= age adjusted, per 100,000.

Sources: Adult mortality from the CDC WONDER program. Infant mortality from U. S. Bureau of the Census, 2001. na= not available because of insufficient cases.

The contrasting histories of the two states are relevant to understanding their structure and associated life-styles. Nevada was populated by waves of explorers, miners, ranchers, casino operators, gangsters, entrepreneurs and their auxiliaries. Starting about 1830 they came alone or in small groups. Just the opposite with the Mormons, who migrated as a unit across the U.S. during the same period, building communities and defending them against armed attacks along the way. They arrived in Utah in 1847 as much mobilized for defense as for tilling the land. Is it any wonder that the life-styles of the two states diverge?

Fuchs characterizes these life-styles as the opposite ends of a spectrum, classifying Nevada as the “jungle” and Utah as the “zoo”. He believes that people were attracted to Nevada over the decades by its permissive mores, while the inhabitants of Utah were “evidently willing to remain in a more restricted society” (p. 54). This overall comment on the stability of the two states is the only hint that anything other than life-styles causes ill-health. Indeed, early in his book, he comments adversely on the determined refusal of reformers to admit that individuals “have any responsibility for their own distress” (p.27).

Fuchs’ metaphor is accurate only up to a point. Jungles actually contain a great deal of organization in the delicate ecology of animals and plants. Likewise the idea of a zoo does not fit Utah in important respects. The Mormon church, and even less so the state of Utah, does not control its members as if they were animals in a cage. The church hierarchy seems to allow a great deal of local flexibility, and members can always leave the church.

As a causal explanation, the life-style hypothesis is vulnerable to the objection that “it could have happened anyway.” Structuralists claim that if the life-styles that Fuchs cites were shuffled like a deck of cards, the contrasting structures of the two states would produce the same death rates. This would happen because the

distal structural contrasts are stronger and more pervasive. Everyday language acknowledges this distinction with terms like “precipitating” or “immediate” to distinguish the proximate from the distal events.

How then do these two types of structure determine population health? The structuralist answer is that Utah’s continuing high level of mobilization works to moderate behaviors of all kinds, not just those labeled “health habits.” Communities with strong structural profiles borrow or create transaction organizations that may increase positive health. In the case of Utah, the state government took over an idea that the Mormon Church had developed during its early years. It adopted one of the church’s basic principles, that recipients of aid should perform community service if they are able to and they should return to paid employment as soon as possible.

The membership of the Utah church constitutes such a large proportion of the state population that church programs can affect the population health of the state. Therefore, other features of the extensive and complex church program are pertinent. Welfare aid is considered an entitlement and is extended discreetly to avoid embarrassment. A network of counselors advise church welfare recipients in self-reliance, prudent living and the avoidance of secular welfare. They also assist with career development, financial management, physical health and in finding employment opportunities. In fact, the system of counseling and support is available for all aspects of life including, and perhaps especially, family relations. In structural terms it may be characterized as a comprehensive program designed to enhance problem-solving capacity for all church members, and it seems to be especially effective in urban environments (Mangum, 1992). From this perspective the Mormon avoidance of tobacco, alcohol and coffee (but not sweets) that Fuchs emphasized becomes a minor element in a larger mosaic.

The structural comparison raises a disturbing question: Is this type of beehive solidarity the path to population health? And if so, is it one that many people could follow? While calling attention to the historical mobilization of this religious group, structural theory reminds us that other strategies can improve health. We do not yet know the consequences of different structural profiles, but we may confidently assume that more than one combination will enhance health. At any rate, Zopf (1992:214) reports life expectancies in several U.S. states that are higher than Utah’s, which was 75.7 years as of 1979-81. Iowa and Minnesota did better, which suggests that the ethnic homogeneity of the population is important. On the other hand, Hawaii, which is both multi-racial and multi-ethnic, stood first with 77.02 years.

JEWISH IMMIGRANTS IN LONDON

Historians of immigration have noticed the superior health of Jewish immigrants despite poverty and the dislocation of moving to a new country, and they have attempted to explain this advantage by pointing to the way Jewish mothers raised their children, the observance of food and cleanliness rituals in the family and the many community-wide organizations and practices that supported the immigrants. The problem with these many suggestions is that they are particularistic. The list of practices is long and detailed, and their precise content varies with the neighborhood and the particular wave of immigration. What is needed is the very thing that historians cannot supply: a conceptual framework. Structural theory claims to

have formulated the kind of model that this problem requires and that the history of Jewish immigration supports.

Statistical information from earlier years, particularly for migrating ethnic groups, is rare even in Great Britain where record-keeping is a government preoccupation. However, proxies can be found. Marks (1994) was able to use the infant mortality rates from the census districts of East London to show the contrast between those with predominantly Jewish populations and those with non-Jewish residents. During the 1880-1910 period that Marks studied, the three Jewish areas showed generally lower infant mortality, especially in the years following 1895 (1994:48).

The requisite data or proxies for adult mortality are difficult to come by, but knowledgeable observers reported that the Jewish workers in Glasgow had lower rates of acute infections such as typhoid and typhus and that they “scored well on (other) health indices” Collins (2001:5). A possible exception to these favorable ratings was trachoma, an infectious eye condition that can cause blindness. However, the evidence for higher prevalence rates for Jews is not strong, and the rates of Irish immigrants were certainly higher.

In Manchester around the turn of the century, statistics showed a general death rate per 1000 of 21.8 as contrasted to 16.9 for the Jewish immigrants Collins (2001:159). This difference is not accounted for by the higher proportion of young people among the Jews. The selection of the healthier members of the population for immigration may have introduced a bias and we do not know whether the Jewish advantage continued to hold in later decades. But there is reason to believe that it did, because in poor neighborhoods the non-Jewish death rate was 33.9, twice as high as that for the equally poor Jews. The Jewish community evidently had a health advantage even under conditions of poverty.

What accounts for the better health of the Jewish immigrants? The possible causes may be classified according to community levels, specifically the family, the neighborhood and the wider Jewish community in Great Britain. As the title (*Model Mothers*) of her book implies, Marks believes that contemporary observers were correct in thinking that Jewish mothers were exemplary in their attention to household chores, their practice of stopping work during pregnancy and breast-feeding. The role of housewife and mother was reinforced by traditional Jewish custom which, among other restrictions, “exempted” women from religious tasks and communal decision-making.

A fundamental feature of the Jewish migration was that whole families moved. These initial high rates of familism continued in the form of taking in refugee relatives and limiting the number of abandoned wives and Jewish women in disreputable occupations, such as prostitution (Marks, 1994:14; Gartner, 2001:166ff). Very likely the higher level of religiosity in these families helped to maintain their unity. At the extended family and neighborhood levels, Jewish immigrant families were materially assisted by relatives who had already settled in Britain. Some of the immigrant women had developed roles as “handywomen,” while untrained midwives from Eastern Europe supplemented the family income by helping trained midwives in Jewish maternity hospitals. The reluctance of Jewish women to give birth in non-Jewish medical facilities set up pressures early on for the creation of Jewish institutions.

One of the organizations concerned with the general state of immigrants was the Union of Jewish Women, founded in 1901 (Marks, 1994:100). Among other things, the UJW provided loans for women to train for work with the Sick Room Helps Society. By 1898, there were more than 150 Jewish benefit societies in East London (Marks, 1994:34). Most of these were “friendly societies,” organized to provide loans and similar material assistance, but quite a few were formed from segments of synagogue congregations.

Overcrowded conditions, frequent interruption of the water supply and decrepit housing, including the sanitary facilities, characterized East London (Gartner, 2001: 152). The Jews themselves tolerated and contributed to the rotting garbage, the foul water closets, untrapped sinks and cracked walls. In response to these conditions, the Jewish Board of Guardians appointed a “sanitary committee” and its own inspectors to supplement the work of the city. This work continued for 20 years and included education of the tenants as well as pressure on landlords to improve the premises. But it would be a mistake to focus solely on the health-related organization. The many trade and homeland (i.e. places of origin in Eastern Europe) associations provided ideas, security and material help during family crises.

At the national level, the Jewish Board of Deputies, established in 1760, managed the interaction of the wider Jewish community with Parliament and the British public. This organization represented all the synagogues and was particularly concerned with religious issues such as the observance of the Sabbath. Another national organization, the above-mentioned Jewish Board of Guardians (founded in 1859), was more concerned with the prevention of poverty and the preservation of respectability. It made loans and assumed special tasks, as noted above, but it did not hesitate to repatriate persistently indigent families. The Board preferred this solution to sending them to the workhouse, where their ethnicity might be noticed and held against the Jewish community as a whole.

Standing behind these formal organizations were the settled Anglo-Jewish families such as the Adlers, the Franklins and the Rothschilds. This informal leadership was extremely sensitive about the place of Jews in London and Great Britain generally. The overriding concern of the national organization was the defense of the Jewish community. Memories of harsh laws and pogroms in Russia and anti-Semitism in Eastern Europe were kept fresh with each new wave of immigrants, and it was imperative to avoid becoming targets in Great Britain. Taken together, the threats the Jewish community faced were comparable to the situation of the Mormons. In both cases, the non-Jewish residents threatened the continued existence of the newcomers who arrived as a strong community of believers. The fact that one group was urban while the other was rural is immaterial. The structural dynamics are the same. Behind all the particular responses was the general mobilization in defense of the community. It is a mistake, therefore, to focus on the Jewish mothers, Jewish rituals, the Board of Guardians or the guidance of the Rothschilds. All of these are simply the concrete embodiment of solidarity in the face of serious threat. Very likely the immigrants also maintained a higher level of structural differentiation. For example, when the more affluent residents left East London, the poorer neighbors managed to move with them, thereby maintaining the full range of leadership skills. In addition, the factional contestation among Jewish subgroups was rife. Even the tailors who mobilized to strike in 1889 argued

continually. It is possible that all this arguing weakened solidarity. On the other hand, the overriding commitment to the community probably inhibited violence and allowed leaders to gather any workable ideas for presentation at formal meetings.

THE ROSETO STUDY: A REANALYSIS

The “Roseto effect” refers to the likely superior health that a local physician first noticed in Roseto, Pennsylvania. He reported in 1961 that in comparison with the men in nearby towns, those in Roseto had low death rates from coronary artery disease. This is the kind of surprising fact that has motivated scientific investigations for centuries, and health researchers Bruhn and Wolf (1979) followed it up. A systematic study established that Rosetan men did indeed have lower rates from heart disease (Egolf et al. 1992), and that none of the usual risk factors—hypertension, smoking, high fat and cholesterol diets—differed from levels in the control group. What was different was the way Rosetans lived in a village of 1600 people with a “family-centered social life, absence of ostentation even among the wealthy, nearly exclusive patronage of local business, and a predominance of intra-ethnic marriages” (Egolf et al. 1992:1089; see also Wolf and Bruhn, 1993 and Lasker, Egolf and Wolf, 1994). Eventually, however, Roseto began the process of “Americanization,” with a consequent reduction of three-generation families and a weakening of commitments to traditional values and practices such as inter-ethnic marriages. Seeing this trend, Bruhn and Wolf (1979) predicted rising rates of myocardial infarction.

Their interpretation focused on the long-term change from an equal-status community to one where differences in wealth and possessions had become conspicuous. Kawachi and Kennedy (2002) echo this hypothesis:

Alas, as the younger generation of Rosetans began to move away to seek jobs in neighboring towns, and the community entered the mainstream of American life, the once-tight community bonds that held the town together began to weaken, as did the social taboos against conspicuous consumption... [A]s social bonds weakened within the community, the rates of heart attack in Roseto caught up with neighboring towns within the span of a decade. The health advantage that Rosetans originally enjoyed...became thus an unexpected casualty of their improved material standard of living, along with rising socioeconomic disparities. (156-7)

Inspecting the trends more closely (Table 7.2), it is clear that those for both myocardial infarction and all-cause mortality are better described as a horizontal “J” that turns down in 1975-84. Some of the ratios are not significant but the J curve describes all four rows. Within this pattern, there are two discrepancies. First, the rates during the first decades are flatter than they should be if the acculturation hypothesis is true. That process should raise the rates more steadily. Second, although the Roseto rates surpassed those of nearby Bangor during the 1965-74 decade, they fell in the next decade. For all-cause mortality, the male 1975-84 ratios dropped to their 1935-44 level and those for women dropped below it.

The figures for both ratios suggest that the results may be complicated by a cross-cutting event in the form of the “Sixties” social revolution. This pervasive social movement could have caused the ratio of male heart attacks to increase to 1.15 during 1965-1974. The increase in risky behaviors on the part of young men coupled with the widespread challenges to paternal authority during that era would have been especially hard on the older men of Roseto.

Table 7.2 Standardized mortality (per 1000) ratios of Roseto to Bangor, 1935-1984

	1935-44	1945-54	1955-64	1965-74	1975-84
Myocardial infarction					
Men	0.58*	0.66*	0.66*	1.15	1.03
Women	0.53*	0.70*	0.65*	1.07	1.06
All-causes					
Men	0.77*	0.86*	0.80*	1.08	0.78*
Women	0.96	1.13	0.79*	1.17*	0.76*

* Difference between the Roseto and Bangor rates significant at the .05 level. Ratios less than 1.0 indicate lower rates for Roseto. (Adapted from Lasker et al. 1994.)

The relative size of Roseto's population of 1600 as compared to Bangor's 5000, one mile away, may also be significant. The description of the two places suggests a hamlet-town relationship and the possibility that social cohesion was greater in the smaller place as a reaction to the town's control. This potential seems to have been realized as a result of the dominance of the Bangor-based Welsh slate mine owners over the Italian laborers who worked in the mines from 1883 to 1962. Roseto had a history of resistance to Welsh deprecation and discrimination. Indeed, under the leadership of their priest, they won their strike for higher wages around 1900 (Wolf and Bruhn, 1993). Thus, community cohesion was more than the maintenance of Italian traditions. Some of it developed as a defense after the immigrants arrived in Roseto. If so, we may expect it to continue to protect the population. The all-cause rates support this interpretation, but the continuing high ratios (1975-84) for heart disease do not. Yet there may be an explanation for this discrepancy.

Wolf and Bruhn discuss the exercise level of the Roseto men, even though they seem to want to sweep this variable under the rug. They note the historical fact that the men were engaged in strenuous exercise in the slate quarries during the first 50 years of the town's existence and comment: "Whether exercise played a salutary role among Rosetans during the early years, and, conversely whether reduced exercise may have been harmful during recent decades is difficult to assess" (p. 101). What they fail to make explicit is that, unlike the other risk factors they studied, this one is not compared. At no time did the men in Bangor do such heavy work. But the men of Roseto reduced their exercise level when mining terminated. That may have kept the myocardial rate high.

As often happens, the facts of this case study become blurred. The impact of a unique historical period and the physical activity variable complicate the interpretation. Yet social solidarity is still the most reasonable interpretation, and it is all the more pertinent in view of Roseto's apparent capacity to rebound from the social disruption of the 1965-74 decade. Note, however, that the interpretations of cohesion turn on different definitions. One rests on tradition while the other emphasizes mobilization. The first is a cultural interpretation while the second is structural. Does it matter? It does for structuralists, of course, who are interested in finding their favorite variables at work and demonstrating that they are more

heuristic. In this case there are two examples of solidarity: the village against the town, and youth against their more traditional fathers. But structuralists are also interested in finding the limits of structural interpretations. For example, the change in the level of exercise seems purely individual until we remember that we are looking at a rate that dropped after slate mining came to an end. Shifts like that are almost always structural.

Another problem that bears on the Roseto story is the impact of migration and the possibility that many place effects are due to selectivity. The structuralist perspective on this problem is a variant of the Sampson and Wilson (1995) defense of their study of crime in large cities that was cited in Chapter 5. The claim is that if a causal dynamic exists, it should hold for each community level. If in statistical tests a process like selective migration undermines a community dynamic, it can only do so, according to structural theory, if the community dynamic overlapped with a subordinate household dynamic. Migration can be interpreted as a typical response to threats like unemployment. In other words, the dynamics of community levels are independent. Their effect on population health may combine in various ways, but if structural theory applies, they cannot be disrupted by individual-level control variables. Such controls reflect the individual-in-society paradigm and are ruled out by structural theory.

BOWLING LESS OFTEN IN NORTH CAROLINA

Case studies are helpful and sometimes indispensable for identifying structural contrasts, but eventually variables must be measured and compared. The ultimate goal is to classify communities according to their structural profiles and link these with the insights on strength and weakness derived from the case studies. But the analysis of structural profiles is just beginning, so research must take intermediate steps. One of these involves studying the correlates and consequences of growth and decline. These two trends are assumed to reflect the impact of threats on community strength, as reflected in the three dimensional profiles. Pending direct studies of the more fundamental threat-structure dynamic (i. e. $ph=C/t$), much can be learned. I undertook such a study of the 100 North Carolina counties following the model worked out for New York counties (2006). It starts with a factor analysis of available indicators as shown in Table 7.3

Table 7.3 Factor analysis of county characteristics

	F1 Urbanization	F2 Growth	F3 Decline
Purban	0.92		
Manufacturing	0.79		
Mobil homes pt	-0.79		
Churches ptt	-0.66		
Physicians tt	0.58		(0.37)
Pch lf7789		0.86	
Phousing8090		0.85	
Mdn value		0.74	(0.36)
Pch income8090		0.73	
Pnative		-0.73	
Facpluralism			0.91
Retail pht			0.76
Pman8090			-0.64
Fac score range	-1.6 – 4.0	-1.9 – 4.4	-2.1 – 3.4
R ² explained	39.2	19.5	11.5

VARIABLE DEFINITIONS (mean; standard deviation; minimum-maximum):

Purban90=Percent of population in places 2,500 or more. (27; 25; 0 – 90). Source: U.S. Census, 1990 unless otherwise indicated.

Manufacturing=Small manufacturing establishments, 1990. (67.5; 105; 5 – 727).

Mobil homes pt=Mobile homes per 1,000 population. (89.6; 37; 8 – 275).

Churches ptt=Churches per 10,000 population. (24; 11; 7 – 66).

Physicians tt=Physicians per 10,000 population, truncated. (124; 98; 11 – 482).

Pch lf7789=Percent change in the labor force, 1977-89. (23; 31; -30 – 187).

Phousing8090=Percent change, number of houses, 1980-1990. (20; 14; 2 – 96).

Mdn value=Median value of houses, 1990. (57881; 13382; 37400 – 108100).

Pch income=Percent change in family income, 1980-90. (84; 12; 50 – 116).

Pnative=Percent of residents who are natives, 1990. (75; 12; 32 – 90).

Facpluralism=Factor score for pluralism. See text and Young and Lyson (2001) for the four component items.

Retail pht=Retail establishments, 100,000 population. (2230; 654; 1010 – 5654).

Pman8090=Percent change, manufacturing labor force, 1980-1990. (-15; 11; -42 – 13).

The first factor, Urbanization, is defined by the high “loading” (i.e. the correlation of a particular item with the bundle formed by all the others in the factor) of percent of the population living in urban centers, frequency of small manufacturing establishments, and many physicians per 100,000 population. The negative loadings (i.e. the correlation between a single indicator and the cluster of indicators of which it is a part) for mobile homes and churches per 1000 population are typical of rural areas.

The Growth factor is defined by the percent change in the labor force, percent change in the number of houses, the median value of housing, the percent change in family income and the percent of residents who are native (negative loading). All but one of these indicators reflect actual change over a decade. The indicators of

economic growth are straightforward and are superior to the indicators of decline, where only one is an explicit measure of change.

The Decline factor is defined by the pluralism index, the number of retail establishments per 100,000 population and the percent change in manufacturing employment (negative). The reduction of manufacturing is an indicator of decline all across the U.S., and it is often associated with a high frequency of small retail establishments that survive in poverty contexts. The first indicator, pluralism, is best interpreted in this context as the associational component of the middle class in the disappearing manufacturing communities. Membership in clubs, exchanging information in restaurants, barber shops and the like tend to persist even after the factories have closed. Two other indicators bear mention although they do not meet the conventional .50 loading threshold. These are physicians per capita (loading of .37) and the value of housing (.36). There is also evidence that the proportion of elderly residents is higher. These declining counties still have resources, and they continue to support the many associations that are components of the pluralism factor. In other words, the pluralism measure is not out of place as a component of Decline. The people in these counties may be “bowling” less often as some of the associations disappear, but they still support the remaining organizations.

The regression results are shown in Table 7.4. I used age and race-adjusted average mortality over 1979-1999 (Centers for Disease Control and Prevention, 2005) as the criterion. The descriptive statistics are shown at the foot of the table. Averages for the 20-year period insured reliable estimates, especially for the counties with few African-Americans. Consistent with this broad cross-section, the analysis used measures of the independent variables as of 1990.

Column 1 in Table 7.4 shows a positive coefficient of .45 for the association of Decline and black mortality. That is to be expected if manufacturing loss is especially hard on African Americans, who may hold the secondary jobs in manufacturing communities. But why does Decline correlate -.48 with white mortality, paralleling the negative correlation with Growth? How can we explain a coefficient that says the greater the decline, the better (i.e. lower mortality) the health of whites? Do the whites benefit from decline?

Table 7.4 Regression analysis of black and white mortality in North Carolina counties N=99

Predictors	Black mortality	White mortality
F1 Urban	-0.12	-0.02
F2 Growth	-0.12	-0.34*
F3Decline	0.45*	-0.48*
R ²	0.21	0.33

Black mortality=Age adjusted mortality, black, 1979-99. (1271;193; 801 - 2019). Source: CDC Wonder File, 2000.

White mortality=Age adjusted mortality, white, 1979-99. (949; 78; 784 - 1107).

F1 Urban=Factor 1, Urbanization. See text and Table 7.3 for details. (0; 1; -1.6 – 4.0). F2

Growth=from Table 7.3. (0; 1; -1.9 – 4.4)

F3 Decline=from Table 7.3. (0; 1; -2.1 – 3.4).

One resolution of this puzzling finding focuses on pluralism in the context of declining regions. As already suggested, pluralism and the social participation that goes with it, perhaps especially among retired people, continues on even in declining counties, providing protection against the higher mortality that usually comes with Decline. In North Carolina, pluralism is embedded in the Decline factor and works to improve population health despite the drag of the other components in Decline. This interpretation is admittedly shaky, but if it can be replicated, it throws a different light on declining communities and opens the door to public health interventions in other places.

DEMOCRACIES AND AUTOCRACIES

In the course of making their argument for the superiority of democracy in fostering development, Halperin, Siegle and Weinstein (2005) show the correlations of democracy and a range of development indicators among poor countries, i.e. those with less than per capita incomes of \$2000. (See also Przeworski et al., 2000). They assume that if democracy benefits poor countries it will always work. As hypothesized, they find that poor democracies show higher GDP growth rates from 1970 to 2000—if the special group of fast-growing but autocratic East Asian “Tigers” is excluded. With respect to life expectancy, it was not necessary to exclude South Korea, Taiwan, Hong Kong and Singapore from the sample. Their bar graph for the four decades starting in the 1960s shows the superiority of the democracies in all decades. They summarize the trend: “people in low-income democracies have had life expectancies that are eight to 12 years longer than those in autocracies, on average” (p. 35).

These facts and arguments for the developmental superiority of democracies support the structural ecology claim that “contestation” is an adaptive dimension. True, these authors define democracy more broadly than contestation, but there is considerable overlap (Halperin et al., 2005). For them, democracies are “those governance systems in which national leaders are selected through free and fair elections, there are institutions that foster a shared distribution of power, and citizens have extensive opportunities to participate in political life” (p. 9). All three of these elements imply contestation when that term is taken in its broadest sense. The similarity of the two concepts is strengthened by their elaboration of the advantages of democracies. Most pertinent to the structural interpretation is their claim that democracies (as classified in the widely used Polity IV dataset) are better at mitigating disasters. More generally, democracies are better able to generate the institutions that foster economic development, many of which also foster population health. The checks and balances, the rule of law, a free press and transparency in politics are examples.

The autocratic East Asian countries that contradict their hypothesis can be explained by their greater accountability—in bureaucratic efficiency, rule of law and space for the private sector. Other factors that favor one or more of these countries are good economic policies, especially with respect to property rights, experienced Chinese businessmen, Japanese capital, access to foreign markets, income equality, capital mobilization, Cold War support from the U.S., competent civil services and some scope for free expression. Many of these variables are the kind that the World Bank has been supporting and are more consistent with its economic theory

than with the role of democracy. On the other hand, many of the liberal economic policies overlap or are consistent with democratic practice.

One feature of democracies that these authors document is especially pertinent to the structuralist claim that contestation improves population health: their relative stability. Using the coefficient of variation, a standard measure of dispersion, they calculate coefficients for five income levels (0-\$500 to \$5,000+) and find that the democracies range around 4, while the autocracies average about 10 with two above 20. In other words, the autocracies show wider swings in the economy, which means more stress on the population. Such stress disrupts health habits and increases mortality.

Structural theory can accept most of these arguments and adds another that is rarely mentioned. The East Asian countries have achieved high levels of national mobilization. The small countries on the margin of the continent have always been under threat from the mainland, and many were overrun by Japan. That leaves China's solidarity to be explained in terms of internal threats and the Japanese attack during World War II.

This analysis of democracies is timely because, as the authors document, democracy is spreading. Even discounting the many sham elections, nearly half of the countries in the world have made advances in the last 25 years, and most of these were low-income countries. Moreover, the movement is spreading to all regions. Africa has the largest number of democratizers, although the median score is low. At the other end is South Asia, with few countries but with a high average score, although not as high as Latin America and Central Europe. The only dark cloud on the horizon is the growing tendency for Islamic countries to choose religious candidates.

HOW DO STRONG COMMUNITIES REINFORCE TRANSACTION ORGANIZATION?

These comparisons raise the question: How does the multiplicative interaction work? How do communities with strong structural profiles reinforce the transaction organizations that do the actual work of maintaining health? Piore and Sabel's (1985) discussion of "municipalism" in the dynamic Italian region around Bologna illustrates the process. Their many descriptions of regional networks of small businesses coordinated by municipal authorities are prototypical. In this part of Italy, municipal organization fostered the sharing of a central source of steam power, helped in making adjustments for fluctuating demand, guaranteed the availability of resources, policed competition, organized credit, and improved health and safety conditions. All this works because "everyone knew, and was known to abide by, a long list of rules of fair behavior: had these rules required formal application, they would have prohibitively delayed shifts from one grouping of firms to another" (1985:32). This description is good as far as it goes, but it is misleading in suggesting that the local government causes the effect with its many directives and rules. Structuralists reject this picture of causality because it cannot be tested. Which of the almost infinite moves brought about the general synergistic effect? It is impossible to say.

Another example is T. W. Schultz' (1953) hypothesis linking cities to improved agriculture in their hinterlands of countries with strong urban organization. Schultz argued that city organization increased the economic efficiency of factor and product markets. Because of proximity and communication, the markets for labor, land and capital "worked" better, and farmers were better able to market their crops. This explanation satisfied economists but it becomes clouded when we look at all the other specialized organization in cities. Who is to say that the organization of Protestant churches, extending into the hinterland, does not increase the efficiency of economic processes? Or the movies that farmers attend on the weekends? Economists emphasize economic efficiency, which is of interest to almost everybody, but innovations in agriculture probably involve more than relative prices. And, of course, there is the question of population health, which this book takes as the yardstick of progress.

The structural explanation of synergy effects would start with a typology of the three structural dimensions, beginning with high differentiation contrasting with low pluralism and mobilization. This is the strong urban-centered format that has been successful almost everywhere in the world. Comparable examples for a dominant pluralism or solidarity are infrequent and measurement is a problem. Some utopian communities advertise their respect for everyone's opinion, even though major decisions may be decided by an oligarchy. Likewise, highly solidary communities, such as the Mormon-dominated places in Utah, achieve their cohesion under the direction of a leadership group that may strike outsiders as authoritarian. Clearly, these impressions must be rigorously examined and the dimensions validly measured before it will be possible to construct more complex types where, for example, two of the three dimensions are markedly higher than the third.

What actually causes transaction organizations to "correspond" to a particular structural profile cannot be stated as a causal sequence because the relationship of structure and the characteristics of transaction organization is tautological, true by definition. What is truly causal, by the definition used in this book, are the social movements that can result in increments of the three master dimensions. Once these are in place, local agencies and organizations change in order to benefit from the enlarged structural context.

CHAPTER 8 *EXISTENTIAL THREATS AND DEVIANT RESPONSES*

The previous chapter summarized research on communities that have achieved good population health despite problems and threats. Although such research is still in its infancy, the findings suggest that improved population health is possible even in the face of adversity. If, however, communities fail, we can expect lower levels of health and internal dynamics that include a wide range of what can only be called “deviant” responses. This chapter examines these unsuccessful communities more closely, along with the threats that may disrupt them and the deviant responses that undermine population health.

Figure 8.1 expands the core hypothesis ($ph = C/t$), beginning with the many external problems that beset communities. These are in principle unlimited, but in practice the perceptions of community leaders as well as the constraints of a particular region reduce the possibilities. In the second column, the strong and weak communities are distinguished in terms of their structural profiles, as defined by the three master strategies. The diagram shows the communities when all three structural dimensions are high and again when they are low, but there are many other possible combinations that have not been explored. The third column provides examples of the internal reactions that may become threats themselves. These translate the external impacts and set up the causal sequence of habit deviation, suboptimal biological functioning, and low vitality that in this model bypasses the immune system/microbial attacks ratio that is central to the biomedical causal sequence.

The diagram could be elaborated by listing examples of the categories and many of these will appear in Table 8.1. At this point we focus on the general features of the hypothesis. First, the proposition is a hybrid. It combines the categories of threats and the many concrete responses with the three structural concepts. Second, the diagram intentionally omits the biomedical causal path and implicitly claims that an alternative to the stress-immune-system-weakness-disease outcome is possible. In the outcome column, vitality is preceded by habit moderation and optimal functioning. These sound like components of the biomedical model but they are not. Habit moderation would include all the recommended practices that researchers announce almost monthly, but it is the variability, not the content of the practices, that appear in the structural model. Optimal functioning is a molar concept that includes but does not focus on the immune system. These two links in the structural model’s chain of causation pose formidable measurement problems, but they are feasible in principle.

THREATS AND PUBLIC HEALTH

The view among public health professionals is that the important threats to health are fundamentally biological and can only be addressed by drawing on biomedical science. Structural theory does not reject that paradigm but it claims a complementary causal path, and introduces a new category of threat, social problems, and goes on to claim that unmanaged external and internal problems impact on

population health. Table 8.1 outlines the model and the newly recognized social threats and responses.

At the national level, the threats include armed attack, deficiencies of mineral and biological resources for a given technical regime, aggressive/exploitive trade practices, the social dislocations of epidemics, authoritarian and/or corrupt government. Coups and civil wars are often threats from lower levels, specifically cliques and ethnic/cultural regions. Many other threats to the nation-state are internal and are best conceptualized as weakened transaction organization. The breakdown of democratic procedures and mismanagement of economic forces are examples.

Figure 8.1 Diagram of responses to external threats, showing contrasting reactions of strong and weak communities

THREATS	STRONG COMMUNITY	RESPONSES	OUTCOMES
Examples: a. Land degradation b. Economic decline c. Corporate exploitation d. Immigration e. Disease pandemic	Specialized skills Policy debates Reform mobilization	New laws Programs Support groups Sporadic deviance	Habit moderation Optimal functioning Vitality
	WEAK COMMUNITY Low specialization Political rigidity Low solidarity/autocracy	RESPONSES Ethnic enclaves Gangs Deviance	OUTCOMES Habit disruption Bodily dysfunction Low vitality

Public defenses at the national level include professional military and police, institutionalized trade negotiations, monetary regulation, a free press, safety-net policies, laws and amendments to the constitution, maintaining decentralized institutions, enactment of “rights” and “diversity” programs, enlarging the scope of dedicated agencies or creating new ones, and manipulation of taxation to favor disadvantaged population segments. Although national governments often borrow policies and agencies from one another, they also make frequent use of the general problem-solving strategies such as elaborate election campaigns or nationalist movements and ceremonies. Indeed, under the threat of long-term decline, some countries invoke rarely used general strategies, such as the radical nativism currently pursued by Muslim countries.

Examples of threats at the intermediate levels are uncontrolled agriculture and manufacturing practices, deindustrialization and outsourcing, interethnic conflict, and demographic shifts that burden local resources. Some threats are also responses to other threats, such as international competition and neo-colonial control. Some of these responses simply “make things worse,” and must be treated as internal threats.

Table 8.1 Defenses against non-biological threats by level of community

Threats	Defenses
NATIONAL LEVEL	
Armed attack	Military and police
Deficiencies of mineral and biological resources	Trade negotiations Monetary regulation
Aggressive/exploitative trade practices	Free press Safety-net policies
Social dislocations of epidemics	Laws and constitutional amendments
Authoritarian and/or corrupt government	Decentralization
Breakdown of democratic procedures	Rights and diversity programs New or enlarged welfare agencies
Mismanagement of economic forces	Manipulation of taxation to favor disadvantaged
REGIONAL, STATE, COUNTY LEVELS	
Unrestrained agricultural & manufacturing practices	Laws and regulations Commissions, agencies, programs
Plant closings	Interethnic conflict
Environmental disruptions	Civil rights
Demographic shifts	New professional specialties
LOCAL AND FAMILY LEVELS	
Neighborhood gangs	Policing
Unregulated vehicle traffic	Welfare programs
Jobless, forced moves	Faith and class supports
Dualized classes	
Weak/disrupted family structure	
INTERPERSONAL	
Chronic abuse or neglect	Neighborhood pressure
Victimization	Intervention by specialists Alliance with formal organizations

The public responses range from passing laws and regulations to establishing commissions and agencies, strengthening ethnic identities, enforcing civil rights, and creating new professional specialties. Communities may set up agencies for prohibiting discrimination and establish programs for the poor, the elderly, the disabled and the unemployed. The last several decades have seen considerable experimentation with such interventions, especially in connection with the “war on poverty.” Structural theory is not concerned with the labeling of programs

like these, except to note that they may be part of a causal sequence that leads to improvements in population health.

Threats to neighborhoods and families are better known because they have been the focus of pathogen-based public health. Structural theory sees internal developments like gangs, unregulated vehicle traffic, increased alcohol and drug consumption as trial-and-error responses. At lower levels of community, these “responses” are usually viewed as “deviant”, even though, from the perspective of structural ecology, they are trial-and-error responses to adversity.

Several broad features of this list are worthy of note. First, the items are virtually endless. Each of the categories can be split into narrower types, and it is unlikely that theoretical concepts can be found for classifying them. The changing environment/response interplay militates against true conceptualization. Second, unmanaged threats at one level tend to bear down, in changed form, on lower-level communities. The familiar sequence of plant closings, unemployment and alcoholism reflects this cascading process. Third, the list is organized by “levels” because both threats and defenses are level-specific and also, subordinate levels depend on higher levels for protection and assistance.

While acknowledging the importance of short-term emergency behaviors, structural theory postulates that on average moderate behaviors have the greatest long-term survival value. However, their role as intervening “mechanisms” for explaining positive population health poses a major problem for structural theory, which looks to distal causes as fundamental. Does that mean that the theory does not credit intervening behaviors with any causal efficacy and that educational campaigns are mostly ineffective?

That, in fact, is what most social epidemiologists who have researched health practices claim (Marmot et al. 1998; Syme and Balfour, 1998) Indeed, shortly after John Knowles (1977) published his provocative article on the “responsibility of the individual,” Berkman and Breslow (1983:221) criticized his position for not recognizing the social context of individual behaviors. Their research had demonstrated the statistical association of personal ties and/or socioeconomic status with “good” health behaviors and thence to longevity over the years following. (See especially the chapter by Wingard and Berkman, 1983, and replications Lantz et al., 1998). Although these findings and lifestyle in general are widely recommended by doctors, they have not been incorporated as yet into the biomedical model except as ad hoc interventions.

One reason that biomedical researchers have not paid more attention to health practices is that they see them as simply modifiers of what for them is the real cause, which is the resistance/pathogen threat ratio. Social epidemiologists assign them a place in their causal chain, but designate SES and social support as ultimately causal. But when they do so, they usually leave the resistance/threat ratio out of the discussion. Located as most of them are in the medical establishment, it is probably difficult to downgrade the R/T ratio, even when they are convinced of the reality of social causation. Structural theory not only accepts the individual-level social causes but finds a standard set for all community levels. Health practices are a crucial intervening set, but the theory identifies their variability, not their physiological interaction, as causal. This conceptual move requires that the R/T

ratio be excluded from the structural causal train. It also involves the claim that there are two kinds of health, vitality and wellness (in the sense of freedom from disease). This claim of a second pathway will probably encounter resistance for years to come. (See Young, 2006b.)

FAILED STATES AND HEALTH

The changing fortunes of nation-states are relevant to the problems that communities at all levels confront in responding to threat. In the last decade political scientists have directed research to the many states that are sovereign in name only. They do not deliver the goods and services that are expected of them, and autocratic rulers use the government and its income as a private bank. In seeking to understand these communities, we can do no better than to summarize Robert Rotberg's (2003) review of recent research on "failed states." He begins by defining a strong state as one that delivers collective goods: security, both external and internal, adequate infrastructure, order and justice, political and civil rights, education, health and similar services. Weak states deliver fewer services. Rotberg mentions some attempts to construct or adapt scales such as the UNDP Human Development Index, a Corruption Perception index, and the indicators of political and civil rights monitored by Freedom House (2003:4), but research is in its infancy.

Not satisfied with a simple strong-weak continuum, Rotberg distinguishes between failed and collapsed states. The former manifest eroding boundaries and the conversion, often at gunpoint, of government bureaucracies into an arm of a predatory clan. In other words, the minimal indicators of state structure begin to disappear. Examples are Afghanistan under the Taliban, Angola, Burundi, the Congo, Liberia, Sierra Leone, and the Sudan. A collapsed state is an extreme version of a failed state, defined by the transference of state functions to warlords and their regional organization. Rotberg names only Somalia. In some cases villages and families are left to survive on their own against armed gangs.

Drawing on the material in the separately authored chapters, Rotberg summarizes the many uncodified "causes" that have been identified. He mentions natural handicaps, such as a landlocked or desert location. Then there are climatic disasters. States may also suffer from the hostility or control (as in colonialism) of other states, and some have been caught in the crossfire of great powers. Economic loss or mismanagement is even more frequent. If the organizational aspects of these threats were more fully described, many of them would qualify as indicators of the strength-weakness continuum. Also, threats and disorganization tend to merge.

We do not have adequate data on the population health of failed states, but there is impressionistic evidence that supports a negative correlation. Studies of the East-West life-expectancy gap in Eastern European states point to a decline in health after the Soviet collapse and its subsequent withdrawal of subsidies (Hertzman, Kelly and Bobak, 1996). By 1990, all the Soviet bloc countries had higher male mortality rates than any of the twenty European countries (Watson, 1995). This contrasts with 1970 when six of the seven Soviet bloc countries (Hungary, the exception) had lower male mortality rates than at least some of the European countries. What accounts for this reversal of fortune?

Unlike Eastern European men, the mortality rate for women dropped below the 1970 rate and the complete separation of the Eastern and Western rates was not evident. Indeed, the female death rates in Scotland and Denmark were higher than in three of the Eastern European countries. While the East-West gap in the male mortality rate that has appeared in the last two or three decades is mostly the result of the life expectancy in the West outstripping that in the East, in three countries, Hungary, Poland and Bulgaria, male life expectancy actually declined. Changes in life expectancy at all ages account for the gap; both infant and working-age mortality have increased (or failed to improve) in the Eastern European countries. Finally, researchers were able to pinpoint the proximate causes of death (for a review of the evidence, see Bobak and Marmot, 1996). The rates for cardiovascular diseases and coronary heart disease increased in the East and remained high, while the rates in the West declined. The contribution of other diseases was less pronounced.

A number of possible explanations were formulated and then rejected. Putting aside “historical differences,” which do not really explain, we are left with the quality of medical care, environmental pollution, diet and lifestyle and socioeconomic deprivation. A number of authors mentioned psychosocial stress, but that is better discussed as a component of the other explanations.

Medical care can be rejected because the per capita quantity of personnel is comparable in the Western and Eastern countries, and the quality of care is not different enough to account for the recent and dramatic increases in mortality. Environmental pollution can be ruled out because it has probably declined, at least since 1989, as industries were forced to shut down. Furthermore, intensive studies demonstrate that the contribution of pollution to increasing mortality is limited.

The data on diet and lifestyle simply do not connect with the marked increase in male mortality due to cardiovascular disease. Eastern European men do not consume more animal fats than men in the West. Neither is their cholesterol significantly higher. Smoking and obesity are higher in the Eastern European countries than they are in Sweden and Germany, the two reference countries, but the difference for males with respect to obesity is not great, and much less than that for females, whose death rates are lower. That leaves smoking, which probably contributes to the gap, but not enough to account for it completely. Also, smoking raises the question of what causes increases in that habit.

The one cause that these researchers could not reject was “socioeconomic,” because it is supported by the known facts of social disintegration of Eastern European countries both before and after the destruction of the wall in 1989. But the problem with the socioeconomic explanation, as Hertzman and Marmot (1996:211ff) note, is that there are too many versions and they must be organized with the help of a trichotomy of levels. Thus, the macrolevel explanation emphasizes broad factors like GNP per capita, industrialization, and unemployment. The “meso” level explanation calls attention to networks, norms and trust, or the lack of them, and links these deficiencies to the reduced coordination and cooperation in civil society. The “micro” level is, of course, the intimate realm of the family and the social support network of friends and relatives. All of these explanations, it should be noted, involve auxiliary social psychological hypotheses that are often quite complex.

Unfortunately, these explanations are ambiguous and amorphous. The problem is not that they are first approximations lacking precision. Rather, the “concepts” are inherently untestable. These authors speak of changes in the “character of social networks,” the “quality of public values” and use social psychological terminology that rests on assumptions about aggregate beliefs and dynamics. It is true, of course, that judgments of testability vary with the research style. Questionnaire-based scales of depression, optimism, work strain and relative deprivation have been constructed and seem to be valid for the samples under study. Whether these operational definitions can be conceptualized in a way that applies across national contexts is, however, another question.

ECONOMIC THREATS IN NORTH CAROLINA

The hypothesis that weak communities typically fail to respond adequately to existential threats and suffer lower population health as a consequence has multiple origins. Sociologists (Israel and Schurman, 1991; Park, 1998; Rankin and Quane, 2002; Sampson, Raudenbush and Earls, 1997; Van Dyke and Soule, 2002) have used the idea, and it is a fact of common observation and history. Diamond’s book *Guns, Germs and Steel* (1997) chronicles the never-ending encounters between strong and weak communities and the genocide that the losers typically suffer. The derivation of this hypothesis from structural theory turns on defining capacity as a product of structure and transaction organization ($C=S*o$) and then making capacity the numerator of a ratio that has threat(s) as the denominator, i.e., C/t . The resulting ratio interaction is the hypothesized cause of population health levels.

Structural theory does not specify the kinds of responses that communities make to impending threats because the circumstances are so different. If older white men lose their jobs and the communities have a history of right-wing organizations, then it is likely that “militias” will form (Van Dyke and Soule, 2002). If an ethnic group is in the process of “invading” a region, then we may expect ethnic conflict. If the threat involves depopulation and the disappearance of entry-level jobs, then youth problems may appear. A more general response is the wide range of “poverty” behaviors, from job-sharing to migration to religious fundamentalism. Research traditions on some of these responses exist, and datasets are available.

This hypothesis linking internal problems to population health is explored with newly available data on the 100 counties of North Carolina, where indicators of adolescent deviance are available from the Annie E. Casey website CLIKS. When these are combined with census-derived indicators for the counties of North Carolina, a fairly comprehensive dataset is available for factor analysis as shown in Table 8.2.

The first factor is labeled “Poverty” because it combines the percent of working-age adults who reported to the 1990 census that their handicap kept them from working, the percent of families below the poverty line, the median value of housing, the median level of schooling (both with negative loadings) and the percent unemployed. These indicators span the 1990 decade but the cluster is stable. (Lack of stability would introduce so much measurement error that the item would drop out of the matrix.) This factor explains 39 percent of total variance and generates a factor score that ranges from -2.7 to 3.6 with a mean of 0. The descriptive statistics

and data sources are listed at the foot of the table. This factor is deficient in lacking indicators of the active responses that poor people make, but these are implicit in the schooling, unemployment and especially the percent unable to work.

The second factor combines the violent crime rate for 1990, the rate of violent crimes attributed to juveniles, the percent of black low-birth-weight (lbwt) births and the teenage pregnancy rate. This “Deviance” factor explains 22 percent of total variance and encompasses a wide range of behaviors that are embedded in the composite crime indexes.

Table 8.2 Factor analysis of social problem indicators for North Carolina counties N=99

Indicator	F1 Poverty	F2 Deviance
Pnowork	0.89	
Pfampov	0.86	
Mdnval	-0.85	
Medsch	-0.84	
Punemp	0.71	
Crime, violent		0.77
Crime, juvenile		0.74
Plobwt		0.65
Pregteenb		0.59
Range of factor scores	-2.7 – 3.6	-2.1 – 2.8
R ²	0.39	0.22

Descriptive statistics (mean; std. dev.; minimum, maximum).

CLIKS (2000) is the default source. Note: Cherokee county was omitted for lack of sufficient black residents.

Pnowork= the percent of working age people who responded to the 1990 census question that they had a disability that kept them from working. (7.7; 2.7; 2.6 – 18.2).

Pfampov=percent families below poverty line, 1990. (12.3; 4.8; 4.8-23.8). Census.

Mdnval=median value of housing, 1990. (57881; 13382; 37400-108100). Source: U.S. Census, 1992.

Medsch=median grade, 1990. (11.7; .6;10-14). Census.

Punem=Percent unemployment, 2000. (4.8; 2.4; 1.3-13.1).

Crime violent=index of murder, rape, robbery and assault per 100,000, 1990. (387.8;292.1; 0-1400). Source: U.S. Dept. of Commerce, 1992.

Crime, juvenile=violent crime per 1000 juveniles, 2000. (1; .8;0-4.3).

Plobwt=percent low-birth-weight births, blacks, 2000. (11.9;5.8; 0-25).

Pregteenb=pregnancy rate per 1000 black teens, 2000. (55.5; 32.1; 0-167).

Structural theory views both Deviance and Poverty as reactions to unmanaged threats, an interpretation that removes most of the volition from these factors. They are treated as county-level attributes despite the many household and individual-level items. When the two factor scores are dichotomized at 1 or higher, there are 16 high-scoring counties for Poverty and 20 for Deviance. Only five counties score 1 or more on both factors. By this criterion, 69 counties have no high scores.

Following the format of structural ecological theory, this analysis uses age-adjusted mortality as the yardstick for assessing the adaptive superiority of

communities. As shown at the foot of Table 8.3, the age-adjusted mortality average for the 20-year period 1979-99 for the 100 counties of North Carolina is 1271 for blacks and 949 for whites (CDC Wonder file, 2000). This two-decade span was necessary to insure reliable estimates and to parallel the slow-moving macrosocial processes that the threats embody. Due to the higher maximum of 1873 (even after truncating several outliers), the range for black mortality is much wider than that for white mortality. Looking at the figures another way, the average gap between the mortality of blacks and whites for the 20-year period was 322.

Table 8.3 Regression analysis of black and white mortality in North Carolina N=83

Predictor	Black mortality	White mortality
Purban90	-0.05	0.30*
F1 Poverty	-0.16	0.74*
F2 Deviance	0.41*	0.09
R ²	0.13	0.42

Note: N=83 after dropping the 17 counties in the western Mountain region. See text.

Definitions and descriptive statistics (mean; SD; minimum-maximum).

Black mortality=Average age-adjusted mortality, black, 1979-99, truncated. (1271;193; 801 - 1873). Source: CDC Wonder File, retrieved from <http://wonder.cds.gov>.

White mortality=Average age-adjusted mortality, white, 1979-99. (949; 78; 784 - 1107).

Purban90=percent living in places of 2500 and over. (27.1; 24.7; 0 - 90.1)

Table 8.3 shows the results of this test of the hypothesized association of the measures of black and white mortality with the two types of social problems, controlling on percent urban. Deviance predicts higher black mortality for the county population while Poverty predicts white mortality. We cannot know from these associations whether blacks are actually involved in deviance, but that knowledge is unnecessary. All we need to know is that deviance somewhere in the county is associated with black mortality. The same point holds for Poverty and white mortality. Both deviance and poverty in a county disrupt health habits and reduce average biological functioning for at least a segment of the total population, thereby increasing mortality rates. The fact that whites do not suffer from high levels of deviance may be due to the de facto segregation of African-Americans and to differential police protection. Likewise, the lack of an association between black mortality and Poverty may be due to welfare payments and/or to an acceptance of a lower standard of living.

DUALIZED COMMUNITIES

Looking more closely at the 17 counties in the “vacation region” of North Carolina that had to be dropped from Table 8.4, it is apparent that the black-white mortality gap is enormous: 642 as compared to the average of 250 for the other three regions. For a region with many college-educated whites in the towns, this gap between whites and the rural blacks is disturbing. Further study suggested a sharply dualized structure in the counties of this popular vacation region. What seems to be happening is that well-educated and affluent tourists and retirees are attracted to this area where they have little contact, perhaps by design, with the rural native population, many of whom are black.

Although the small sample handicapped regression analysis, a single multiplicative measure captured the dual structure. As detailed at the foot of Table 8.5, it was formed by multiplying the percent blacks living in the rural sector of the county by the percent with some college education. This multiplicative index predicted both black and white mortality, controlling on urbanization. The explanation for this correlation is that dualization restricts both races in ways that cause fluctuating health habits and higher mortality.

Table 8.4 Regression analysis of black and white mortality in the Mountain region N=17

Predictor	Black mortality	White mortality
Purban90	0.07	0.24
Pblkrxcollege	0.67*	0.79*
R ²	0.31	0.34

Black mortality=Age-adjusted mortality, black, 1979-99, truncated. (1271;193; 801 - 1873). Source: CDC Wonder File, retrieved from <http://wonder.cds.gov>.

White mortality=Age-adjusted mortality, white, 1979-99. (949; 78; 784 - 1107).

Purban90=percent of population in places 2,500 or more.

(27; 25; 0 - 90). Source: U.S. Census, 1992.

Pblkrxcollege+pblkrurd x pcollege. Pblkrurd is the dichotomized percent black living in the rural part of the county. (2.1;4.5; 0 - 14).

Clearly, the relation of dualized communities to mortality deserves more study. This type of community is probably more widespread than the vacation region example suggests, but even those must be frequent. It is possible that affluent vacationers demand segregated areas to the detriment of the local populations who provide tourist services.

Are there any interventions, or ongoing trends, that may improve the lives of people living in the segregated subcommunities? Discussion of such initiatives can often illuminate the thrust of a theory. As it happens, this region has experienced a significant movement to renew the folk culture of the region and create a multifaceted vacation/retirement region. It was spearheaded by members of the southern leisure class who were interested in fostering cohesion and expanding their own life-style. The newfound respect for the rural neighborhoods in the region has probably facilitated their integration, helping the native whites to cope with the decline of agriculture and the blacks to enter the labor market. Once a social/cultural/ movement gains momentum, much can be done to consolidate the gains. The county seats and larger towns in this region appear to be functioning well and could reinforce the integration of the rural neighborhoods. That means extending basic services and the urban cultural innovations to the rural areas. Eventually this integration will happen by itself if the young people in the rural areas have access to a high school education, but at the present time there is probably considerable social distance between the rural and the town-based students.

ETHNIC CONFLICT AS A PRIMARY THREAT

In his penetrating book on the American South, James Cobb (1992:210) reports a small but telling example of how racism undermines problem-solving. In 1945,

the town of Greenville, Mississippi, failed to establish an honor roll for veterans of World War II because some white veterans objected to having their names listed with blacks, even under separate headings. With such intransigence, it is hard to see how this town could cooperate on non-symbolic projects. Structural theory takes this line of thought further by claiming that such lack of cooperation reflects the low solidarity that fosters immoderate behavior. Divergent practices in turn undercut biological functioning.

The disruptive impact of racism is illustrated by a well-known set of studies. LeClere, Rogers and Peters (1997), for example, found that the concentration of African Americans in neighborhoods (i.e. census tracts) was associated with higher mortality, net of individual characteristics. This finding contrasted sharply with the correlation of Hispanic ethnic concentration and lowered mortality rates. These authors suggest but do not pursue the hypothesis that it is the segregation of blacks by whites that accounts for the concentrations in some neighborhoods. This hypothesis would explain the opposite impact of Hispanic concentrations if we assume that the mechanisms of segregation do not impinge so strongly on them. Massey and Fong (1990) carry the explanation further by arguing that segregation limits the ability of black people to “convert” individual assets to better residential locations. Even if a black person is educated and has a higher income, he or she will be blocked from moving to a less segregated neighborhood. The structural explanation proposed here amounts to an enlargement of the Massey and Fong argument because it would classify moving to better neighborhoods as a concrete problem solution, one of the many that families might come up with. Structural theory would interpret the benign effects of Hispanic residential concentration by noting, as did Massey and Fong for neighborhoods in San Francisco, that such concentration is more likely to be voluntary and transient. The concentration of blacks, in contrast, is imposed.

Ethnic conflict often accompanies racial segregation and is a potential threat to all the residents of communities. A striking example of this pervasive impact has been identified for the five counties that make up the New York City metropolitan region. The coronary heart disease (CHD) mortality rates for the counties in the New York region are the highest in the state despite the generally high income of these residents. The newspaper article (Fessenden, 2005) that reported this surprising fact included a map of the U.S. that showed the other high mortality counties. They are scattered throughout the South, including Texas, but with a concentration along the Mississippi delta region, one of the poorest in the country.

The contrasts in mortality rates that define this problem are easily summarized. For the 50 counties in upstate New York (north of Orange and Dutchess), the mean age-adjusted CHD mortality for African-Americans 35 years and older is 553 per 100,000 and 557 for whites. These rates are almost the same despite the generally higher black death rates found elsewhere. The range of the white rate is 119, with no significant skewness. The black range is 482, much wider than that for whites. In contrast, the five counties of the New York region show a rarely seen white rate of 688 as compared to 650 for blacks.

The accepted starting point for explaining an anomaly like this is the updated biomedical theory of disease that almost all epidemiologists accept. As described in Chapter 2, its core mechanism is the “balance of power” of host resistance relative to pathogens. The original paradigm (i.e. the “germ theory”) has been enlarged over the

last century by adding contaminants, poor nutrition, injury, stress and so on to the list of “proximate determinants” and by identifying social determinants like income, education and social affiliations that strengthen host resistance. Epidemiologists can draw on an impressive research tradition, but so far the attempts to explain the New York City puzzle have been unsuccessful.

The alternative ecological explanation claims that ethnic conflict is one of the serious social problems that cause mortality differentials if the community is so weak that the threat cannot be “managed.” Then neighborhoods, families and individuals respond with a range of actions, some of which are deviant. These responses generate more threats that disrupt the traditional health habits of the residents. In research on health and ethnicity, the health impact of racism, in the sense of white control of blacks, has been singled out (Clark, Anderson, Clark and Williams, 1999; Collins and Williams, 1999; Krieger, 2000; Williams and Collins, 1995), and it has been linked to cardiovascular mortality by Polednak (1997:162), and Karlsen and Nazroo (2002). But there is another tradition that looks at the threat that expanding black communities can have on the behavior of dominant whites, provoking prejudice and discrimination (Quillian, 1995). Such studies are rare because serious black threat is infrequent. And previous research has not linked the white reaction to mortality.

In view of the opposite causal directions in these perspectives, formulating the basic hypotheses might seem easy. The racism hypothesis states that white dominance impacts negatively on blacks, while the minority-expansion hypothesis claims a negative impact on whites. But immediately there is a difference because whites use a range of techniques, from laws to informal controls on residential location to manipulation of job opportunities (Hummer, 1996). In contrast, blacks are usually limited to direct political pressure and demonstrations. At the same time, the minority groups in the community, including the poor whites, are struggling with threats such as unemployment that impinge on them directly. These threats also generate a range of deviant responses, including crime and retreatism, and these disrupt the body maintenance habits of both blacks and whites.

The “arena” for the racism and minority-expansion hypotheses is the encompassing community, which in this case is the county. This community is dominated in most cases by whites who attempt to manage any expansionist tendencies of the minorities, and to maintain the status quo despite deviance by both races (Massey and Denton, 1993). The disturbances that must be controlled are more likely to erupt when a weak minority subcommunity is unable to manage a threat, especially unemployment. This complex situation of ethnic conflict limits the empirical tests because we lack data on the policies of the dominant whites. Nonetheless, the hypotheses include the presumed role of the dominant whites:

1. Strong racism hypothesis: If the white ethnic group is organizationally strong, it will attempt to impose segregation on the minority, and the latter will show high rates of mortality.
2. Weak racism and black marginality: If the white ethnic group is organizationally strong but laws restrict its control, the dominant group will impose a marginal status on the black minority, resulting in high rates of deviance and mortality.
3. Black expansionism: If the dominant white group is weak or restricted by

law, then black expansionism and deviance will threaten whites and increase the white mortality rate.

4. Displacement of dominant whites: The same hypothesis holds for a white minority threatening a weak or tolerant dominant group. Successful expansionism may involve neighborhood succession leading to higher white mortality.

What stands out in these hypotheses is that both ethnic groups are under threat in some form. They also imply the zero-sum type of conflict that is typical of ethnic conflict, the most primordial kind. It is no wonder then that heart-disease mortality is a sensitive criterion. The threats are pervasive and the physiological reaction is molar.

THE INTERVENTION DILEMMA

This chapter has assembled evidence for the hypothesis that the internal social problems are responses to existential threats to communities and that such behaviors become internal threats that cause higher death rates among the residents of the communities. If, as the hypothesis states, deviance is one of a gamut of responses that residents make in their attempts to defend against existential threats, then public health interventions can either remove the threat and/or increase community capacity. What communities should not attempt single mindedly, if the hypothesis is true, is complete elimination of the deviant behaviors. Communities must defend themselves against crime, of course, and agencies must attempt to ameliorate the suffering that the residents experience, but it should be done in the full knowledge that the efforts are palliative, not preventive. The assumption in causal sequences like this, moving from distal to proximate to outcome, is that proximate causes are never causal; only distal causes determine whether events unfold according to a predictable sequence.

This argument has been made previously by Wilson (1991) in his foreword to Prothrow-Stith's book *Deadly Consequences* (of youth violence). In the space of two pages, he posed the distal-proximate-cause dilemma by recommending the book to practitioners working with adolescent violence and claiming at the same time that only strong economic policies, not programs, have any effect. He says: "Adolescents who live in neighborhoods that have limited legitimate employment opportunities, high rates of joblessness and poverty, poor schools, inadequate job information networks, and few conventional role models are far more likely to be exposed to or exhibit violent and aggressive behavior. In these neighborhoods... youngsters are more likely to see violence as a way of life. They are more likely to witness violent acts, be taught to be violent by exhortation, and have role models who do not adequately control their own violent impulses or restrain their own anger."

It is surprising, then, to read that *Deadly Consequences* recommends a broad campaign of media-based education. As Wilson summarizes: "What is required, [Prothrow-Stith] maintains, 'is a broad array of strategies, strategies that teach new ways of coping with angry and aggressive feelings.'" Perhaps, but if Wilson is right, the feelings will continue to exist, ready to erupt into overt violence the moment the situation worsens or the coping skills weaken. So long as the fundamental causes continue to operate, feelings are going to run high except for those who have alternative social organization on which to draw.

It is true that Prothrow-Stith's book contains chapters on families, school and communities, and some of the recommendations might be interpreted as responding to Wilson's analysis. But the recommendations are mainly social psychological—show respect for adolescents, make sure they learn conflict resolution in school, work with the young men who are brought to emergency rooms in ambulances, use the media to spread the word, and the like. She recognizes the impact of absent fathers, gangs and the loss of middle-class leaders, but seems to think that these can be overcome by learning to cope. To a sociologist of Wilson's persuasion, Prothrow-Stith's recommendations must have seemed like thin soup. But what can he and others like him offer? The return of manufacturing jobs? Increasing "collective efficacy" in the hard-hit neighborhoods? Blacks moving out to the suburbs where young black men with less than a high-school education must compete for jobs with the college-educated young people?

At this point, critics will say that at least Prothrow-Stith proposes some feasible actions. Even the structural ecology framework would have to concede that trial-and-error can sometimes turn up a workable strategy. But if Wilson and like-minded structuralists are right, we can say in advance that certain categories of interventions are not cost effective and may not be effective at all. Then it is likely that scientific understanding will simply intensify the frustration of the many applied workers who are expected to intervene. Even so, an understanding of causality, even a hazy one, is preferable to pursuing superficial remedies.

The problem of interventions has been examined from another angle by Link and Phelan (1995), who made their case for "fundamental (social) causes" by pointing out that the impact of the proximate determinants shifted over time with respect to given diseases and, in fact, the demographic correlates of the diseases also shifted. It was as if freight train changed its middle cars in the course of the trip. The causal engine and the destination remained the same, but the intervening units changed. The clear implication is that even this strong definition of causality allows for a lot of shifting in the middle of the sequence, and therefore programs designed to reduce crime, drug use, obesity, smoking and risky behaviors cannot succeed in the long run. Campaigns against smoking and perhaps even drug use can reduce the practice to the hard-core minimum, but over the long run it will reappear so long as the distal causes are at work. It does not follow, of course, that public health should cancel its campaigns. They appear to have some effect, and with some noxious habits, even a small decrease is worth considerable effort.

Structural theory accepts the generic idea of causality that most sociologists subscribe to. It may be defined as an umbrella theory that defines the processes that constitute a cause and effect and explains how the intervening processes link the two. It is a strong conception because it assumes that no other variable can "derail" the causal train. It works at a high level of abstraction so as to focus on a single dominant causal event or process. Interactions can be causes and changing clusters of intervening "variables" can connect cause and effect. In the proposed structural theory, the cause of population health differentials is the Capacity/threat ratio. The threats are classified "lower case" because they are unstable, shifting with the environment.

In his inaugural statement upon assuming the editorship of the social epidemiology section of the journal *Social Science and Medicine*, Ichiro Kawachi

(2002) addressed the locus of causality problem. “Where the social epidemiologist departs from other epidemiologists is at the level of causal thinking. Instead of posing the question Why did this individual get sick?, the social epidemiologist is motivated by the question Why is this society unhealthy?” Kawachi recognized individual-level causality but rejected the strategy of aggregating individual attributes in order to explain how society impacts health rates. But he sidestepped the other question about causality that hangs over social epidemiology: Can the proximate determinants be causes, or are the distal social variables the only true causes? Kawachi points to neighborhood context, social cohesion and income inequality as probable causes, and these are certainly prime candidates, but they pose a disturbing question: can the biomedical model explain how structural causes like these determine health levels? Or does that model reach its limits at this point, providing space for another? Structural theory claims to be able to answer that question and, if the distinction between the two dimensions of health—disease and vitality—is accepted, then the two theories are complementary, not mutually exclusive.

CHAPTER 9 A NEW TYPE OF PUBLIC HEALTH?

To judge by actual practice, public health professionals have already answered the question in the title of this chapter, but in a surprising way. Yes, social problems cause population health differentials, but there is no need for a new branch of public health. The established discipline can encompass social problems, and in fact it already has. A recent social epidemiology textbook (Berkman and Kawachi 2000) contains chapters on socioeconomic status, discrimination, income inequality, job loss, social isolation and the cohesion of communities. Likewise, the annual meetings of the American Public Health Association include sessions on a wide range of problems and solutions, everything from inequality to human rights. A key date is 1985 when the Surgeon-General held a forum on “Violence as a Public Health Problem” that put the U.S. government’s stamp of approval on the study of social problems like violence (Prothrow-Stith and Weissman, 1999:138). The fact that the pathogen-based biomedical theory that is the basis of public health practice does not cover these problems seems not to concern public health professionals.

THE PRESENT STATE OF PUBLIC HEALTH

Public health organization is the collective effort that communities make to prevent disease and bodily malfunction (Porter, 1999). This definition implies the traditional distinction between prevention and curative medicine, and it maintains the conventional emphasis on disease. It also distinguishes public health from other forms of protection, such as military defense and workplace safety. Public health efforts, which vary according to the scale of the community, embody two principles. The first is that public health organization ideally responds to a range of threats by interventions that apply to all members of the community with only minimum participation on their part. Most people, for example, are protected by water and sewerage systems that they do not fully understand and could not maintain on their own. The second principle is that individuals must take any available preventive steps if the collective efforts fail. A polluted water system prompts families to boil their water, and if malaria-carrying mosquitoes have not been eradicated, residents can take quinine pills.

Over the last two centuries the relative emphasis on the public and the private has fluctuated. As the history of public health makes clear, a major cause of this fluctuation is the introduction of theories and derived techniques that differentially reinforce public or private efforts. Beaglehole and Bonita (1997:211) believe that public health is now “at the crossroads” because the genetic approaches to the control of disease are oriented primarily to individuals and thus compete with the collective efforts of government. The changing character of public health organization has been documented by Mays, Miller and Haverson (2000). They report continuing adaptations to a changing environment, beginning with shifts in the financial support of local public health departments from state allocations to an increasing proportion of budget support from fees for services. At the same time, the services themselves have become more complex. In addition to the traditional concern

with epidemics and unserved populations (maternal health, AIDS victims, etc.), these agencies have frequently taken on monitoring tasks for the workplace and the physical environment, especially toxic chemicals. Organizationally, the biggest change is the rise of managed care. This has meant shifts in the division of labor and new agreements. The same kind of negotiation over respective roles is going on in response to the many new federal initiatives, especially from Homeland Security.

Public health organization will probably rise to the threat of new diseases and the resurgence of old ones because the threats have become global. Even a small outbreak like the SARS epidemic can now dislocate the economies of cities and threaten airlines with bankruptcy. In defending communities against such threats, public health can turn to the biomedical theory that guides research and applications. But public health organization has another major advantage. Health leaders can and do reach out to almost all community sectors. In this effort they are aided by local government which sees population health as an increasingly important collective good, and one that can easily become politically charged. Health is of interest to everybody and responding to diseases has taken on a particular urgency. Other sectors, even education and crime control, cannot command the same level of attention and support. The capacity for linking to other community organizations will be especially important in dealing with the non-biological threats that this book has emphasized.

The structural approach to public health acknowledges the relevance of the biomedical model to conventional microparasites but contends that the theory falls short when it comes to social threats, the “social problems” that the sociology textbooks still call this hydra-headed phenomenon. Structural theory claims that when these threats overwhelm community problem-solving capacity, population health suffers. Said more positively, strong social structure is the ultimate public health program.

TWO FAMOUS PUBLIC HEALTH INITIATIVES

In making the case for collective as against individual-level interventions in public health, Jonathan Lomas (1998) recalled Snow’s pioneering investigation of cholera in 19th century London. Having traced the epicenter of the epidemic to a particular water supply, Snow removed the pump handle and stopped the epidemic in that neighborhood by keeping the local residents from drinking contaminated water. Lomas cites Snow’s intervention as the prototype for a collective public health because Snow and others demonstrated the water-borne character of cholera and later research identified the bacterial cause. But the more pertinent point here is that the rationale of this public health intervention is biomedical. The ultimate explanation of the disease turns on individual physiological defenses.

Another famous proposal illustrates a type of collective public health intervention that is clearly structural—systemic and group-level—and does not really depend on the biomedical model. As Porter (1999:86) and Minkler (2000: 371) tell the story, the German government commissioned the noted physician Rudolf Virchow in 1848 to advise it on the causes of typhus in Upper Silesia. After surveying the region, Virchow recommended various medical improvements but went on to propose land reform and redistribution of wealth. The report was rejected as “political,” a

judgment that prompted Virchow's famous comment that medicine was a social science and politics a kind of medicine.

How could land reform improve population health? Porter classifies Virchow as a "predispositionalist" because he thought that social conditions weakened the physiology of people, leaving them vulnerable to the disease. To that extent, Virchow appears to have been working with a concept of molar biological functioning that could be undermined by social conditions. Structural theory transposes these notions into the following causal sequence: adverse social conditions disrupt community, family and individual problem-solving, prompting a wide range of deviant behaviors ranging from passivity to increased consumption of non-foods like alcohol and drugs. One or more of these behaviors impairs the body's molar functioning, reducing positive health.

A CRUCIAL RELATIONSHIP: VITALITY AND WELLNESS

The introduction of this book held up the possibility that health costs could be controlled by reducing the flow of patients to medical specialists. The implicit claim was that the implementation of a sociological theory of positive health would reduce the need to visit doctors and medical facilities, just as the pathogen-based public health interventions have. The improvement of community social structure would increase vitality levels and reduce the many non-disease symptoms, especially fatigue and recurrent aches and pains, that some populations report. But it may be that vitality and wellness are linked and an improvement in the first influences the second and reduces symptoms. Is that possible?

As mentioned in Chapter 4, SES is inversely correlated with a wide spectrum of diseases. Chapter 4 argued for sociological explanation for the SES effect, one that bypassed the immune system's interaction with diseases. A good starting point is a recent article by Banks, Marmot, Oldfield and Smith (2006) that documents the SES-disease correlation for England and the United States, with the samples limited to white nonhispanics. Both schooling and income correlate inversely with self-reported diabetes, hypertension, heart disease, myocardial infarction, stroke and lung disease. Cancer, however, affected the well-educated more (within large samples of people 55-64 years of age).

These seven diseases tend to be chronic and, so far as is known, non-microbial. If future research ratifies that judgment, it may be useful to refer to these maladies as chronic "malfunctions," just as we distinguish between a punctured tire and one that develops a weak sidewall. That distinction accentuates the debate on the role of the immune system, which is usually invoked to explain pathogen attacks on the body. Is the immune system also involved in chronic diseases?

If we accept that problem-solving capacity influences the distribution of health habits, as the correlation between better habits and schooling suggests, then problem-solving is already at work. The Banks et al. data show that health practices account for some but not all the variation in the listed diseases. But of course, problem-solving capacity is much broader than choosing personal practices. It is involved in dealing with status and racial threats, job changes, marital and childcare conflicts, friendships and memberships. Even more serious threats appear in neighborhoods, towns and states, and these impact on the population as a whole.

The structural account goes on to trace causality from unmanaged threats to a reduction in optimal functioning of the body, seen as a system, which of course includes all the subsystems, especially the “immune (sub)system.” Given this relationship, we may ask how the overall state of the body could not affect its specific physiological components. A proposition like this must be tested, of course, but it would explain both the higher levels of vitality and the broad-spectrum disease effect. (See Seeman and McEwen, 1996:464 for a similar statement; also Berkman, 1995:246).

If true, this cross-link in the two causal sequences points the way to a stronger role for “social” public health. It would justify, for example, the American practice of urging all young people to attend college. The level of college will vary with the student’s qualifications, but all students could increase their problem-solving skills, using that term in the sociological sense defined earlier. Thus, in addition to its direct application to work and living, universal education takes its place as a central intervention of the expanded public health that structural theory implies.

PUBLIC HEALTH IMPLICATIONS OF STRUCTURAL THEORY

The capacity/threat ratio (C/t) applies to all community levels – households, villages, counties, provinces, nations – and professionals should assume that in addition to the individual’s own resources, all levels can affect health. Once recognized, as illustrated in Table 8.1, the hierarchy of community levels is inescapable. Researchers and practitioners alike must adjust all initiatives to the level of community under study. It is the primary dimension of context. Within levels, the formula assumes the application of an appropriate criterion of population health. For counties, age-adjusted mortality is minimally adequate, although years of disability-free life would be preferable. Given the theory’s focus on vitality, an index of disease would not be appropriate. Accepting population health as a general criterion for testing hypotheses facilitates comparisons of social problems. Professionals will continue to promote programs for specific purposes, such as reducing abuse in families, reducing fast driving, or, on a broader scale, poverty, but those purposes do not have an empirical common denominator. Population health is the all-purpose criterion.

A similar perspective is embodied in the postulated structural dimensions, their interaction with transaction organizations and their defensive role in the face of existential threats. The rule is to search for general causal sequences within a (structural) evolutionary framework. These set limits on possible interventions because it is the three general strategies that are fundamentally causal. Given the unpredictable nature of evolutionary change, true causality will not show up in the actions and reactions of transaction organizations, which can predict for given times and places, but they are not fundamental.

Structural theory emphasizes the way problem-solving capacity determines responses to the difficulties that communities at all levels face. The mutual reinforcement of structural dimensions and transaction organizations equips communities to respond to problems using readily available solutions. If none exists, the structural profile guides the search for a transaction agency that can deal with the problem. If the transaction organization is unsuccessful and the structural capacity

inadequate, the impact of the problem is passed on to the residents, disrupting their health habits and undermining their vitality. Looking at the (S*o) process from the other side, it should be clear that structural theory sees the proliferation of programs and projects as the process of trial-and-error that communities pursue when confronted with serious problems. The hope is that a particular program, as happened with Head Start, will be successful and can be institutionalized.

Community agencies reflect previous collective responses to perceived threats, but it is structure that is fundamental. The formula does not show it, but the structural profiles work differently with respect to the adoption of a new transaction agency versus maintaining it over time. The level of the structural dimensions, particularly the degree of specialization, determine the “fit” of a new agency. Small communities cannot absorb a neurologist or even a branch bank. The existence of large regional hospitals in small places is only an apparent exception because they are usually maintained as part of a regional network. In general, the three structural dimensions define capacity for transaction agencies and set limits on the kinds of agencies that the community can attract. Proposed interventions must recognize this constraint on programs.

Once the transaction organizations are in place, the multiplicative (S*o) interaction applies. The structural profile governs how communities exert pressure on factories, commerce and medical facilities. Now, however, another factor intrudes because the instability of transaction organizations as they respond to the changing environment weakens their health effect, leaving the structural dimensions dominant. This asymmetry poses a dilemma for the change agent: the strongest variables are structural but they can rarely be changed. The more malleable variables, such as single agencies, have lesser impacts.

A DIAGNOSTIC CRITERION

Moving to applications of a theory assumes that practitioners know which communities have low population health levels. But such low levels can be found everywhere and communities sometimes improve on their own. A better question is which communities manifest a distinctive health gap that is associated with a known organizational pathology. In the U.S., the gap between black and white mortality is such an indicator. An example is North Carolina, where the average black mortality rate of 1261 per 100,000 far outstrips the white rate of 949 to produce an average racial mortality gap of 322 (Table 9.1). Compounding this high gap is the even higher divergence of black and white rates in the 17-county vacation region in the western part of the state. There the gap is 642, ranging from -20 to 1119.

But how can a county have a negative gap of -20? Is it possible to have a white mortality rate that is higher than the black rate, especially in a poor state? Although we do not know the actual situation in the county in question (Clay in the Mountain region), this exceptional gap sometimes appears in poor counties with few blacks who for some reason are healthier. Prison populations sometimes reverse the usual ratio. The more typical contrast, of course, is a high death rate for blacks and a much lower one for the whites. That contrast appears in the Mountain region and is associated with the segregation of rural blacks in counties alongside the healthy, educated white retirees.

Table 9.1 Descriptive statistics for mortality measures, North Carolina and New York

Measure	State, N	Mean	SD	Minimum	Maximum
Aamb79nc	NC 100	1261	163	801	1873
Aamw79nc	NC 100	949	78	784	1107
Aambwgapnc	NC 100	322	205	-20	1181
Aamb79ny	NY 50	1206	136	983	1223
Aamw79ny	NY 50	944	40	864	1064
Aambwgapny	NY 50	263	128	60	678

Definitions:

Aamb79nc=age adjusted mortality of blacks, 1979-99, North Carolina. Source: CDC.

Aamw79nc=age adjusted mortality of whites, 1979-99, NC.

Aambwgapnc= mortality gap between blacks and whites, NC, 1979-99.

Aamb79ny=age adjusted mortality of blacks, upstate New York, 1979-99.

Aamw79ny=age adjusted mortality of whites, upstate NY, 1979-99.

Aambwgapny= mortality gap between blacks and whites, upstate NY, 1979-99.

When the atypical Mountain region is excluded, the gap for the rest of North Carolina (257) is still wide. A comparison of the four regions reveals that the size of the gap declines from 285 in the west (Piedmont) to 223 in the Tidelands. It appears that the eastern end of the state is advantaged despite the higher mortality of both blacks and whites in the former plantation area. But of course large gaps can appear in two ways. In addition to the high black mortality/low white mortality pattern, the whites may show an unexpectedly high level and the blacks an even higher level. Such high white rates, it will be recalled, are probably a consequence of the continuing dualization of the economy which affects the health of both blacks and whites.

The situation in New York is rather different. In that state, the variations in the generally high black rate determine the size of the gap almost completely. The white rate correlates only .08 with the gap as compared to .96 for the black rate. What seems to be happening is that the white rate has decreased steadily over the last two decades, but the black rate fluctuates. Thus the size of the black-white mortality gaps alerts us to the possibility of structural pathologies, while the strength of the components, whether the black rate alone or both black and white rates, point to contrasts. These in turn can be conceptualized as variations in responses to serious threats, some of which generate internal social dualization for the communities.

The black-white mortality gap in the U. S. is highlighted here because it is emblematic of a festering problem in many parts of the world. Now that the “rights revolution” has spread almost everywhere, ethnic minorities are demanding justice and international agencies are supporting them. Sadly, there are places in the world where there is no help and hundreds of thousands die or disappear. The fact that we now have words—ethnic cleansing, genocide, sectarian violence, civil war—for these is small comfort. The prospects are better in European countries where the large Muslim minorities are beginning to break out of their high-rise ghettos and demand equal treatment. Against this looming conflict, the black-white gap in the U.S. seems minor, but it is still a problem that must be followed. It is also an example

of the kind of tractable problem that structuralists should attempt to ameliorate before they tackle the more difficult cases.

STEPS TOWARD APPLICATIONS

The fundamental claim of any new theory is that embracing it allows the researcher to see the world differently and sometimes more usefully. The contrast of vitality and wellness, for example, can focus community efforts, and large samples of communities may suggest new ways to look at the distribution of disabilities, which is a gray area between illness and low vitality. A tool for doing this is the exploratory community survey that uses a simple typology of communities to generate correlations between the types and measures of disabilities (Young and Lyson, 2006a). These correlations almost always pose new challenges for explanation, and sometimes they suggest possible interventions.

A related technique is illustrated by the identification of “province types” and their population health correlates in Spain. Lacking a conventional classification like that available for ethnic groups or types of governments, Young and Rodriguez (2005) used factor analysis to classify the 50 Spanish provinces as Big-city centered, Commercial, Industrialized and Tourist. In addition to the conventional demographics, the Spanish census contains rich institutional data (number of banks, hospitals, church archives, etc.) that paved the way for constructing true collective measures. These types (as measured by the factor scores) were differentially correlated with life expectancy, the rates for which were available in the Spanish census website. Surprisingly, the tourist provinces—mostly islands in the Mediterranean—had the lowest life expectancy, due, probably, to the same outsider/native stratification that showed up in North Carolina.

Equally relevant are inventories of community transaction agencies. These summarize past borrowing and innovation and may suggest accelerating the diffusion of the successful agency innovations. What is needed at the present time are guidelines for recognizing viable transaction agencies that are capable of dealing with non-biological threats. As a first step in that direction, we may classify the scope of social defenses as community-wide or sub-group specific. When the mechanism of delivery is taken into account, programs take the form of mass applications or targeted groups.

Table 9.2 shows examples of the four types of social defenses. The first quadrant refers to programs for keeping the built environment clean and orderly. Ross and Mirowsky (2001), for example, have shown that the negative health impact of disadvantaged neighborhoods is reflected in the perceived level of disorder in the form of graffiti, vandalism, noise and the like. Such indicators convey a sense of chronic threat that works against vitality. The built environments of cities and their hinterlands may show the effects of initiatives favoring parks and natural areas, art objects and cultural centers. Conventional libraries are under threat but access to the internet is expanding rapidly. Spaces for political activity, including venues for protests and demonstrations, are now almost institutionalized.

In the second quadrant, moving clockwise, rights legislation for minority groups is the example. Such laws apply whether or not individuals are aware of them, but it does not follow that the impact will be weak. Laws typically create agencies that interpret and enforce them.

Table 9.2 Types of programs for defending against nonbiological threats.

Scope → Intensity	Community-wide	Partial
Mass application	Built-environment protection programs	Rights legislation for minority groups
Face-to-face in groups	Training of workers to deal with periods of unemployment	Defensive skills for adolescents in dealing with predatory adults

The third quadrant also targets segments of the community, but this time the training involves face-to-face interaction. Programs for the children of divorced parents, teen employment skills and general social awareness of threatening adults are examples. The fourth quadrant assumes that almost all adults will experience periods of unemployment and therefore should be offered training in advance of actual lay-offs. Such training may begin in high school and be required for all students. Augmenting problem-solving skills with respect to threats such as unemployment should have a spill-over effect that would strengthen general problem-solving skills.

SOCIAL PROBLEMS IN PUBLIC HEALTH

The discussion so far has omitted the one thing that practitioners will demand: a feasible example of an ideal structural intervention. Applied specialists want the social equivalent of John Snow’s pump handle that, once it was removed, stopped the spread of typhus in the neighborhood (Lomas, 1998). A single intervention protected all the residents against a range of diseases. But finding such a community-wide and group-level remedy is a creative act that is beyond the theory to specify. Also, it is well to remember that although Snow’s action helped in the short term, the water remained contaminated. It took London many decades and a huge investment to build a sewerage system that permanently protected the drinking water. Given this perspective, it may be best to see Snow’s efforts as part of the surge of epidemiological research that now provides the theoretical foundation for public health.

An examination of a recently proposed change involving income redistribution illustrates the problems. Daniels, Kennedy and Kawachi (2000) review the evidence for the income-inequality hypothesis and conclude that such the polarization of incomes (as measured by a gini coefficient or a similar measure) predicts poor health regardless of level of household income, GNP per capita or access to medical services. This happens, they argue, because economic polarization fosters policies that short-change education and safety nets. Moreover, it erodes social cohesion, trust, social participation and the active civil society and better health that are associated with these. The implication is that some kind of income redistribution will improve population health.

The authors of the other essays in the report resist this proposal on almost all counts. They doubt the correlation or they accept it with reservations as to its strength when compared to poverty levels. They wonder how the proposed mediating processes such as stronger safety nets, class-neutral infrastructure and the like would increase population health levels and why medical access is dismissed. But mostly they wonder how feasible such a policy shift is. When the dominant economic perspective recommends cutting taxes, doesn't income redistribution run up against an impervious political opposition?

Daniels, Kennedy and Kawachi concede that more research is needed to convert the available correlations to a tested causal model, but they want to begin the movement toward income equality, or at least the debate, immediately. A policy change like this would affect almost all countries in the world because very few can claim equality of income. In urging this initiative, they are following in the footsteps of many other public health pioneers who did not wait for complete scientific understanding before embarking on campaigns to improve sanitation or the lifestyle practices of whole populations. The public health pioneers had a major advantage in that the proposed changes were obviously desirable in themselves. With urban populations unceasingly assaulted by smells and garbage, sanitation became an immediate necessity. Now, with young people dying of drugs, risky sex and speeding vehicles while the population in many parts of the world is experiencing an obesity epidemic, changes in practices cannot wait any longer. A similar belief is behind the call for redistribution of wealth. Workers are displaced or must accept lower wages while the rich shop for additional houses and luxury goods. The situation reminds one of the economic polarization at the end of the 19th century that prompted Theodore Roosevelt's attack on the trusts and the "malefactors of great wealth."

Despite the weak prospects for radical policy initiatives, it is useful to try to imagine policies designed to enhance general community capacity as represented by the three structural dimensions. One option that future research should explore is the possibility of institutionalizing structural pluralism in regions that have already moved in that direction, building on the momentum. Professionals who aspire to change structure should examine regions closely in the aftermath of a broad social movement for any unrealized potential. Given the emphasis on minority inclusion and "diversity" during the Sixties, it might be possible to improve the position of minorities across all counties and thus increase the level of structural pluralism. Although ethnic subcommunities rarely achieve complete integration, and many do not wish to, it might be possible to convert barriers to social mobility from the rigid stratification that oligarchies enforce to the more permeable status differences that are often summarized by the term "socioeconomic status." Structural theory offers no guidance as to the particular mechanism for achieving such integration; that is one of the many points at which community initiative and creativity come into play.

Building on structural shifts that have already gained traction is the social analogue of "riding the wave." All innovators appreciate its possibilities. Housing entrepreneurs are always searching for the next boom region and venture capitalists gravitate to what looks like another technical revolution. Politicians wait for the strategic moment to launch a needed but unpopular law. Sometimes a health-relevant

change is invisible until it is evaluated and shown to be a component of a structural trend that improves health over the long term. The analyses of the positive impact on health of the mobilizations of blacks and native Americans mentioned in Chapter 6 are examples. The rise of labor unions and the social security legislation of the 1930s await the same kind of evaluation.

Universal college education is not usually seen as health protection, but the structural interpretation of how schooling enhances problem-solving capacity at the individual-level implies such a role. It has the further advantage that it is not need-specific, so in the course of several generations it applies to the entire population. This fact suggests the possibility of augmenting the conventional educational experience by training in social problem-solving. Current experiments with programs should be carefully evaluated for future application in high schools.

Over the long term, however, the population health problem will require the continuing attention of researchers in dedicated institutes. These already exist for other social problems, so creating them or enlarging the scope of those that already exist to include population health should be feasible. The starting assumption for a sociologically grounded branch of public health is that social problems are different from biological pathogens and cannot to be managed in a biological framework. Even if the sociological theory proposed here is not successful, another will replace it so long as vitality is problematical, and two branches of public health, perhaps with contrasting names, will emerge. The growth of “social problems public health” (SPPH) would compete with pathogen-based public health in at least three respects. First, it would force public health to clarify its own theory and construct rigorous tests for the gaps that exist (see Young 2004b and 2004c for a critique). Such clarification would certainly enhance the precision of public health statements, moving them from the goal of improving an amorphous “health status” to a more precise “disease reduction.” At the same time, the many social “risk factors” would be recognized as ad hoc, and the discipline could settle down to the reality that its theory is grounded in the individual’s attributes and therefore ill-equipped to deal with community-level processes. Stated more positively, the creation of SPPH (Young, 2006c) will provide a common denominator—levels of vitality for dealing with a disparate collection of social problems.

SPPH would also compete for a place under the public health umbrella. At first the sociologists engaged in this activity would be ignored so long as they worked in another building and did not challenge the medical model of disease. But as their surveys and inventories increase, there will be contact and conflict. Simply using age-adjusted mortality and similar measures of population health will raise questions, and efforts to reduce the demand for Medicare and Medicaid will indirectly reduce government allocations to the medical establishment. Such reductions will be strongly resisted even though the major cause of limited public health budgets will continue to be the voracious demands of curative medicine.

But there will be plenty of work for SPPH research centers in setting up monitoring systems for mortality and in tracking similar trends for emerging threats. Measurement is a major task for these and for the three structural dimensions. Demonstration of the hypothesized interactions is also crucial. A productive starting point for modeling are the counties of the U.S. states where rich datasets

are available at low cost. Mapping the county locations of the basic variables is a valuable adjunct to the models.

The initial output of SPPH institutes will be maps and graphs of trends and some correlations designed to enlarge perspectives, especially of local government officials. Feasible interventions should flow from these interactions with these officials as well as from discussion of innovations in other counties. If over several decades SPPH begins to show a positive impact on population health, then visits to emergency rooms, medical specialists and facilities should decline. That at least is the theoretical expectation. Enhanced vitality should eliminate many of the symptoms that motivate such visits. And just in time, given the unmanageable costs of conventional care. The structuralist assumption is that the only sure way to manage the costs of health care is to make services unnecessary.

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