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# THE EPIDEMIOLOGY OF PSYCHIATRIC DISORDERS: PAST, PRESENT, AND FUTURE GENERATIONS

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## SUMMARY

This paper briefly reviews the history of psychiatric epidemiology and the future direction. Five generations of studies are described, beginning in 1885 with a community study in Worchester. The second generation studies began after World War II and emphasized social epidemiology. The third generation incorporated the development of structured diagnostic assessments and led to the Epidemiologic Catchment Area study at five sites in the USA and to a number of epidemiological studies throughout the world using similar methods. The fourth generation included the new comorbidity survey, a national probability sample in the USA, which used an instrument capable of bridging DSM-III and ICD classification. The fifth generation began with the development of methods for a psychiatric epidemiological study of children. Future epidemiological studies need to include assessment of family psychiatry history as a risk factor, and promising biological markers. There needs to be regular monitoring to obtain accurate estimates of temporal changes in rates of psychiatric disorder.

KEY WORDS—psychiatric epidemiology; survey; DSM-III; Epidemiologic Catchment Area study

## INTRODUCTION

This paper will review the history of psychiatric epidemiology in terms of the major changes and developments: where we have been, what we have accomplished, what is on the horizon and what has not yet been realized. This paper is meant as a tribute and expression of thanks to Ben Z. Locke, MSPH, who, in his role as Chief of NIMH Center for Epidemiologic Studies, guided the field and provided encouragement and critical evaluation of work in psychiatric epidemiology over nearly two decades.

The history of psychiatric epidemiology has been reviewed in several papers and books by Dohrenwend and Dohrenwend (1982), Freedman (1984), Klerman (1990), Regier *et al.* (1984), Robins *et al.* (1984), Weissman (1987, 1992), Weissman and Klerman (1978), and Weissman *et al.* (1986). This paper attempts to integrate these reviews and extend them into the future. The references to key studies can be found in these books.

## THE FIRST GENERATION

The first generation of psychiatric epidemiological studies in the USA have been identified as beginning with Dr Edward Jarvis in Wooster, Massachusetts in 1885. Dr Jarvis completed the first investigation of the true prevalence of mental disorders, including both treated and untreated cases, in a community sample. He surveyed key community leaders as well as hospital and other official records to determine the frequency of insanity and idiocy, the major psychiatric nosological distinctions at that time. The national census of 1880 also incorporated this distinction and provided the first national estimates of mental disorder.

The 1930s prior to World War II also saw a flurry of epidemiological studies. Indirect procedures of ascertainment from medical records and key informants characterized these studies up until World War II. Representative studies using these methods were reported by Lemkau in the Eastern Health District of Baltimore in 1933 and 1936 and by Roth and Luton in Williamson County, Tennessee in 1935. Lemkau and his colleagues supplemented their procedures with data from direct interviews, determining the frequency of nervousness. These interviews were conducted coincidentally by the National Health Survey in the same district.

Although not a community survey, the pioneering work of Faris and Dunham examining the ecological

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distribution of first admissions to mental hospitals in Chicago in the 1930s should be noted. Diagnoses from hospital records were related to the area of residence of the patients. The highest rates of hospitalization for mental illness occurred in residents from areas with the highest social disorganization. This carefully conducted study demonstrated the importance of social variables in mental illness. Although all of these studies were advanced for their time, they had two major limitations: case ascertainment was incomplete, and diagnoses were taken at face value with little attention paid to their reliability or validity.

### *World War II*

World War II produced a moratorium for community surveys. However, the mental health experiences of the Selective Service and the Armed Forces had a major impact. A large number of young men were rejected from Selective Service for psychiatric reasons during World War II, accounting for the largest proportion of non-acceptance. This included psychiatric rejections due to intellectual deficiency, mental illness or emotional problems. There were questions as to the justification for these rejections and the accuracy of the diagnostic procedures. Nonetheless, publicity was given to the high rates of personality disorders, psychosomatic problems and neuroses, thereby focusing public attention on the public health problems and supporting efforts to obtain more information on the rates of psychiatric disorders.

Neuropsychiatric specialists were widely dispersed in the military medical services and contributed clinical descriptions and statistical documentation of mental disorders such as combat fatigue, transient functional psychosis, dissociative states and stress reactions. It was noted that even young men who were able to pass the Selective Services's psychiatric examination could break down under situations of extreme stress or deprivation. Again, attention was focused on the role of stress as a precipitant of mental illness. In the army, around the Walter Reed Hospital, a group of talented social scientists was organized and, using the best available sampling methods, they surveyed techniques and statistical analysis. They conducted a wide range of studies and developed neuropsychiatric screening questionnaires to relate neurotic symptoms to combat stress and morale problems. These scales were similar to the impairment scales used in community surveys after World War II. The experience of the military served to unify the concept in the post-World War II civilian studies of social factors in mental illness. Poverty, urban anomie, rapid social change, social class and social stress were to become the civilian stress equivalents of combat and threat of death in the military.

## THE SECOND GENERATION

The post-World War II period could be considered the Golden Age of social epidemiology. The experience gained by the military and the growing public awareness of the high prevalence of psychiatric disorders after World War II prompted epidemiological studies in the general population. There was also financial and policy support for these studies when the National Institute of Mental Health was created legislatively in 1946 by Congress and became operational in Bethesda, MD in 1949. Many of the social scientists who had been working in the military on these problems became available to lend their support and technical skills to these studies. A number of studies were organized during this period. Studies representative of the community surveys of this time were the mid-town Manhattan survey by Rennie, Srole, Langner, and the Cornell group, which assessed the impact of urban life on mental health by interviewing more than 1000 adult residents selected by probability sampling in mid-town Manhattan. Other studies included the nationwide survey of mental health by Gurin of the University of Michigan, the Survey Research Center, in which more than 2000 adult Americans selected by probability sampling were interviewed. There were also the cross-cultural studies by Leighton *et al.* (1963a, 1963b), which followed his own work with the Japanese and American internees in California during World War II, and other studies undertaken by him in Africa, north Canada, and the southwestern USA. Leighton, later joined by Jane Murphy, assessed the impact of social and economic change on the mental health of a previously stable community in Nova Scotia (Leighton *et al.*, 1963a, 1963b). The studies in Nova Scotia are still ongoing, and a 40 year follow-up is underway.

All of these studies reported high rates of mental impairment. For example, the Manhattan study, which jokingly became known as 'mid-town madness', found that less than 20% of the population were free of significant symptoms and that 23% were substantially impaired. Other

studies that should be mentioned in this Golden Age are the classic studies of treated prevalence in New Haven, Connecticut by Hollingshead and Redlich, which established social class as an important determinant in rates of treated mental illness. These studies were replicated by Meyers and Bean a decade later.

With some notable exceptions, the studies conducted during this period had certain similarities. They gave attention to the representativeness and completeness of their samples, using impeccable methods of sampling and achieving high rates of response. They decided against using existing psychiatric nosology out of the awareness of diagnostic unreliability and usually substituted measures of overall impairment and mental impairment for traditional diagnostic categories. The use of these general impairment scales, rather than diagnostic judgments made it easier and more economical to execute surveys. Moreover, highly trained psychiatrists were not required to make the diagnostic judgments. Usually, a list of 20 or more symptoms, which were additively scored as an impairment scale, provided an index of mental status independent of statistic diagnoses. These studies also attempted to demonstrate social factors as causal.

In this respect, there was considerable difference between the American experience and that which was adopted in continental Europe and Scandinavia, where psychiatric epidemiological studies grew out of the Kraepelinian tradition. In Europe, the traditional psychiatric diagnostic categories were used, based on the assumption that each illness had a different underlying etiology, course and treatment, and that biological – primarily genetic – factors, rather than social and environmental stress, most likely would explain the cause of the different syndromes. The unitary concept of mental illness in the USA was consistent with the concept of social causation of mental illness. This approach emphasized the importance of life experience for understanding psychopathology and the role of economics, social class and social stress in the etiology of mental disorders. The American approach was heavily influenced by the teaching of Adolf Meyer. Diagnostic categories were considered quantitatively different manifestations of the same causes of mental functioning since common etiological factors such as social stress underlay the psychiatric disorders. Mental health and illness were postulated to fall along a gradient. The most succinct expression of this viewpoint was offered in 1955 by the National Advisory Mental Health Council: "The concept of etiology as embraced by modern psychiatry differs from the simple cause and effect system of traditional medicine. It subscribes to a 'field theory' hypothesis in which the interactions and transactions of multiple factors eventuate in degrees of health and sickness." (Rosen, 1968). The rejection of categories of psychiatric diagnoses and the use of measures of impairment was also consistent in the thinking expressed during an influential series of conferences on psychiatric epidemiology, sponsored by the Milbank Memorial Fund and the World Health Organization as early as 1956. Example, Lin and Stanley, in a report published by the WHO stated, "Instead of attaching a firm diagnosis to each patient, the physical, psychological, and psychiatric findings can be used to isolate symptoms or personality traits that go together . . . This approach has been advocated by some workers who think little of psychiatric diagnosis and may be . . . worth trying to see how much psychiatry can gain from it, even though it implies some reversion to pre-Kraepelinian ideas. The quantitative aspect of morbid psychiatric states also requires attention, an aspect rather neglected in the past." (Lin and Stanley, 1962).

These American studies made important contributions to our understanding of mental health. They enlarged the domain of the independent variable in epidemiology to include psychosocial factors, social roles and help-seeking behavior. They improved measurements of these variables such as recent life events, social class and personality. They sensitized researchers to the influences of psychosocial variables in many medical disorders, as was later reflected in evidence relating stress and personality to cardiovascular disease. These epidemiologic surveys of the 1950s and 1960s generated a considerable body of information on mental health and impairment in the USA, but they also had limitations: they did not generate rates of specific psychiatric disorders and they could not be translated into equivalent clinical diagnostic categories. As a consequence, epidemiological data on rates of treated and untreated specific psychiatric disorders, which became issues of scientific and public policy concern in the 1970s, were not available.

## THE THIRD GENERATION

The 1970s saw rapid developments in other areas of psychiatric research, particularly in

psychopharmacology, genetics, psychopathology and neurobiology. The developments in these fields led to advances in testing the validity and reliability of psychiatric diagnoses strengthening of the evidence of biological factors in the etiology of mental illness and contributed to a redefinition of the traditional medical model as being relevant to psychiatry and, therefore, to psychiatric epidemiology.

The introduction of psychotropic drugs in the mid-1950s led to changes in both scientific investigation and the treatment of psychiatric disorders. The initial contribution of modern psychopharmacology was to stimulate the development of methodology for systematic assessment of patient symptoms, social functioning and diagnosis. Case reports and clinical experience could no longer be relied on to evaluate the flood of new agents that followed the introduction of chlorpromazine. The need to establish efficacy of the new drugs led to controlled clinical trials. Randomized study design, double-blind techniques and placebo controls became the standards of therapeutic evaluation. These studies demonstrated that the new drugs, which had varying neuropsychopharmacologic modes of action, had different clinical efficacy, explained partly by diagnostic type. For example, schizophrenic patients tended to respond to phenothiazines whereas depressed patients responded to the tricyclic antidepressants. These findings supported the concept that psychiatric disorders were discrete and heterogenous, and prompted re-evaluation of diagnosis.

There was a major thrust in the mid-1960s to improve the definitions and develop reliable systems for the description of psychopathology. In 1965, the National Institute of Mental Health Psychopharmacology Research Branch sponsored a conference of classification psychiatry, taking note of the problems created by inadequate diagnosis and classification. In the decade that followed, there were major achievements in understanding sources of cross-national differences in diagnostic practices, improving their precision and reliability and developing methods for their validation. Two major studies clarified diagnostic practices and led to considerable data on mental disorders in different countries. The first, the USA–UK study investigated whether reported differences in diagnostic distributions between patients admitted to psychiatric hospitals in the USA and the UK were real or artifacts due to different diagnostic criteria. The major finding was that the differences in rates were mainly a function of different diagnostic usages. Stimulated in part by these findings, the WHO undertook to determine whether comparable cases of schizophrenia could be identified in various nations with different social and political characteristics. The results of these studies demonstrated that criteria and methods could be developed for the collection of reliable, uniform and comparable diagnoses under varying conditions.

The major development that impacted on the third generation of psychiatric epidemiological studies was in the identification of sources of variances that contributed to the unreliability of diagnoses between clinicians and the development of methods to reduce these sources of variants. Structured clinical interviews were developed to elicit the patient's signs and symptoms in a systematic fashion and to reduce that portion of variances due to differing interview styles and coverage. A set of operational definitions with specific inclusion and exclusion criteria for a variety of diagnoses were developed for reducing the criterion variants that were shown to account for the largest source of error. In the USA, the Research Diagnostic Criteria (RDC) and the structured diagnostic assessment for schizophrenia and depression became widely used methods of interviewing technique and diagostic criteria. Following upon these a decade later, the DSM–III followed by DSM–III–R and DSM–IV were developed.

Psychiatric epidemiology, clinical psychiatry, and research did not begin to converge until the mid-1970s with the introduction in psychiatry of these specific diagnostic criteria, improved diagnostic reliability and standardized methods of assessing signs and symptoms of psychiatric disorders by direct interview. These new diagnostic techniques were needed for case identification and epidemiological studies. Their availability served to bridge the gap between epidemiology and clinical psychiatry.

The new diagnostic techniques were first applied to a small community study of 511 subjects living in New Haven, Connecticut in 1975. This study was a follow-up of the original survey begun by J. Meyers in New Haven, in the previous decade, to determine the rates of impairment in the community. With the community Mental Health Center Act, Dr Meyers sought to determine whether rates of impairment would decrease in an area catchmented for service with the new Centers. Dr Meyers, who had been my advisor at Yale while I was a graduate student in epidemiology, invited

me to join him in planning the survey. The follow-up study called for use of the symptom and impairment, and not diagnosis, measures – the Gurin scale and the CES-D. However, I had learned about the recently available Schedule of Affective Disorders and Schizophrenia (SADS), current status version, and RDC criteria. The inclusion of this instrument would mean that we could generate rates of psychiatric disorders comparable to those used in new clinical and pharmacological research. With the permission of Ben Locke, the survey was delayed six months until a lifetime version (not yet available) of the SADS could be completed and incorporated in the study. At that time, the conventional wisdom was that psychiatric diagnoses could not be made in the community, that subjects would not answer our questions, and there was considerable skepticism as to the feasibility of what we were about to do. Our results from this study, when completed in 1977, showed that the methods were feasible and reliable, and that subjects did not break off in mid-stream of the interview.

Psychiatric epidemiology was also accelerated by social and political developments. In 1977, President Carter established the first President's Commission of Mental Health. Among its many endeavors, leading mental health researchers documented the lack of data on the magnitude and risk of psychiatric illness in the community based on clinical diagnoses. Although the 1975 New Haven community sample of 500 subjects has demonstrated the reliability of a structured diagnostic interview, the SADS Lifetime version (SADS-L), to assess psychiatric illness in the community, the SADS required clinically trained persons, which would not be feasible if a really large-scale epidemiological study was to be undertaken.

It was quite clear that the President's Commission felt that there was an important need for these types of data. To quote from the President's Commission, 17 February, 1977: "Accurate estimates of the burden of illness . . . have significant bearing on the allocation of resources . . . to help ease the burden of illness . . . to promote mental health and to treat or cure existing mental illness, it is necessary to have knowledge of the full range and magnitude of serious psychological disorder in the population . . . to report figures for the incidence and prevalence of overt mental illness in the total population . . . to describe the distribution in the population of serious neurotic behavior, mental or learning disabilities, psychophysiologic disorders, and serious problems with substance abuse. Trends over time in these areas would be useful." In order to determine the availability of such data, Dohrenwend was commissioned to do a complete survey of the available epidemiological data. His survey demonstrated the difficulty of interpreting material from the existing studies (Dohrenwend *et al.*, 1980).

As shown in Table 1, a review in published surveys in North America and Europe on or after 1950 demonstrated that the rates of psychopathology ranged from 0.55% to 69%. Clearly, such a marked variability must have to do with differences in methodology. In 1977, Ben Locke, who was by then Chief of the Center for Epidemiologic Studies, suggested the establishment of multiple community catchment area studies coterminous with the Community Mental Health Centers to provide data on treatment needs (Regier *et al.*, 1984). At that time, Gerald L. Klerman, MD, working with the

Table 1. Ranked rates for all types of psychopathology published in North America and Europe on or after 1950

| Rate (%) | Source |
|---|---|
| 0.55 | Eaton and Wells (1955) |
| 4.11 | Brunetti (1973) |
| 8.33 | Piotrowski *et al.* (1966) (Ciechanov) |
| 8.86 | Essen-Moller (1956) |
| 10.58 | Piotrowski *et al.* (1966) (Plock) |
| 11.90 | Fremming (1951) |
| 12.84 | Pasamanick (1959, 1962) |
| 13.85 | Andersen (1975) (rural) |
| 14.80 | Strotzka (1969) |
| 15.50 | Primrose (1962) |
| 18.00 | Trussell *et al.* (1965) |
| 18.95 | Anderson (1975) (urban) |
| 20.50 | Bjarnar *et al.* (1975) |
| 20.85 | Bremer (1951) |
| 21.79 | Dohrenwend *et al.* (1971) |
| 23.40 | Srole *et al.* (1962) |
| 24.13 | Hare and Shaw (1965) (New Adam) |
| 25.51 | Helgason (1964) |
| 27.11 | Fugelli (1975) |
| 28.20 | Vaisanen (1975) |
| 30.00 | Cole *et al.* (1957) |
| 31.10 | Schwab and Warheit (1972) |
| 34.73 | Hare and Shaw (1965) (Old Bute) |
| 39.70 | Brunetti (1964) |
| 54.32 | Leighton *et al.* (1963) |
| 55.84 | Llewellyn-Thomas (1960) |
| 69.00 | Shore *et al.* (1973) |

From Dohrenwend *et al.* (1980).

President's Commission, had emphasized the importance of surveys of psychiatric illness, using criteria comparable to those used in clinical psychiatry. In 1977, as Head of the Alcohol, Drug Abuse, and Mental Health Administration in Washington, he advocated for a program of research that would obtain these types of data. He argued that without baseline information on the rates of psychiatric illness and treatment utilization, it would be difficult, if not impossible, to plan service needs rationally, and to determine who were the underserved and who was at risk.

Following this work in the late 1970s, the National Institute of Mental Health sponsored the development of a diagnostic instrument, the Diagnostic Interview Schedule (DIS), suitable for use in large-scale epidemiological studies of psychiatric disorders (Robins *et al.*, 1981). In 1980, the Epidemiologic Catchment Area study (ECA) was initiated. This study included over 18 000 adults living in five US communities (New Haven, CT; Baltimore, MD; St Louis, MO: the Piedmont area in North Carolina; and Los Angeles, CA) and was a probability sample of these communities; a separate institutional sample was also included. The DIS developed by L. Robins was the diagnostic instrument, administered by lay interviewers and capable of generating DSM–III diagnoses. The study was longitudinal, with a one-year follow-up to determine incidence (i.e. first onset rate).

There were many discussions as to whether this first study should be a national sample or a sample of various communities, and a decision was made in favor of the latter, due to the need to determine the relationship between psychiatric illness and treatment utilization. It was felt that a micro-analysis of treatment utilization required that there be sufficient samples in any one community. These studies also included over-sampling of Afro-Americans, the elderly, Hispanic-Americans and the rural poor, so that accurate rates of disorders and treatment needs of these groups could be ascertained.

In October of 1984, the first results of the ECA were published in the *Archives of General Psychiatry*. They were introduced by the Chief Editor, the late Daniel X. Freedman, MD, in an editorial punningly entitled 'Psychiatric Epidemiology Counts'. This editorial and the papers it introduced put psychiatric epidemiology in the limelight. He wrote, "To the question of how much and what kind of psychiatric illness is out there, we need no longer blindly grope. It is surely not the picture of a bottomless pit, of an infinitude of psychopathology, nor is it a picture of trivial impairments, self-indulgences, or flaccidity of will. The regularities of definable and quite different disorders, each occurring with distinct and different frequencies should dissipate such myths. Overall, psychiatric disorder appears to have a prevalence above that of hypertension, thus significant numbers of people are at risk for mild to severe impairment, but not an entire population. Policy makers can now, with some confidence, know where to focus attention." (Freedman, 1984).

The ECA demonstrated that, with comparable and reliable methods, rates of psychiatric illness that were comparable between sites could be achieved. For example, Fig. 1 shows that the one-year rates of any psychiatric disorder ranged between 19.1% in St Louis, MO and 27% in Baltimore, MD (these are weighted rates); thus, the previous variability in prevalence of overall psychopathology, from 0.55% to 69%, was challenged. The ECA showed comparability in rates of most disorders among sites, an early age of onset of most disorders, high comorbidity between disorders, the high prevalence of affective and anxiety disorders and alcohol abuse, increasing rates of depression and an under-utilization of treatment by persons with disorders.

The ECA and the availability of the DIS in the 1980s achieved rapid acceptance by many investigators throughout the world. While Daniel Freedman said psychiatric epidemiology counts, questions such as: 'what does it count?', 'is it accurately counting?', and 'does it count for clinicians?' were legitimately raised by the scientific community. However, over the course of the 1980s, comparable epidemiological studies were undertaken in Edmonton, Canada (Orn *et al.*, 1988); Puerto Rico (Canino *et al.*, 1987); Munich (Wittchen *et al.*, 1992); Florence (Faravelli *et al.*, 1990); Paris (Lépine *et al.*, 1989); Beirut (Karam, 1991); Christchurch, New Zealand (Wells *et al.*, 1989); Taiwan (Hwu *et al.*, 1989); and Korea (Lee *et al.*, 1990a, 1990b) (Table 2). The remarkable finding in these studies when using comparable methods is that reasonable similarities can be found between countries, except for Taiwan, which appears to have lower rates of most disorders (Table 3).

Currently, there is a cross-national collaboration in which data on affective and anxiety disorders from these studies are being analyzed using a similar data plan and diagnostic definition. The first paper from this work has recently appeared in

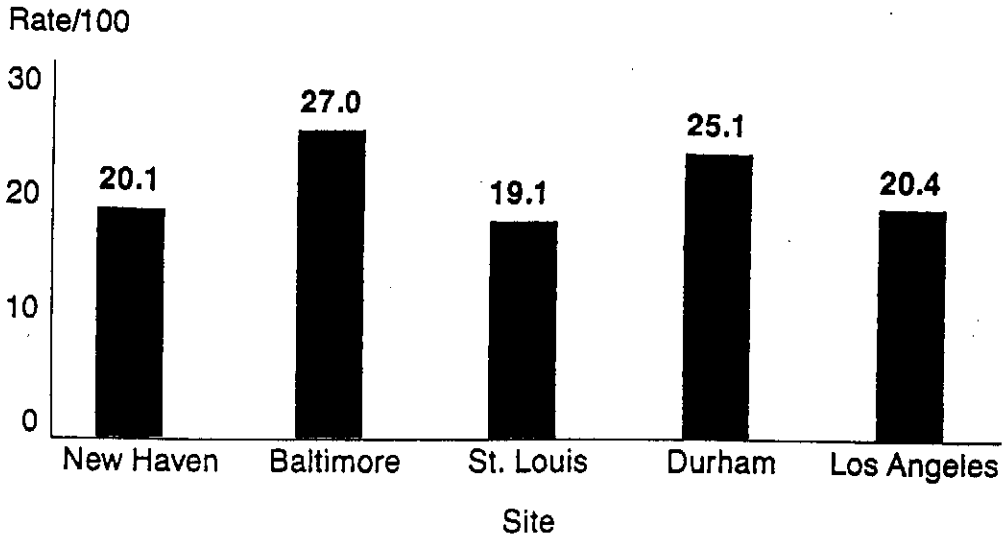


Fig. 1. One-year rate/100 of any DIS/DSM-III psychiatric disorder (ECA)

Table 2. Epidemiological studies using DIS/DSM-III (1980s)

| Site | Investigator | Sample size | Female (%) |
|---|---|---|---|
| USA-ECA | Regier | 18 571 | 59 |
| Edmonton | Bland | 3 258 | 59 |
| Puerto Rico | Canino | 1 551 | 56 |
| Munich | Wittchen | 481 | 52 |
| Florence | Faravelli | 1 000 | 53 |
| Paris | Lépine | 1 716 | 62 |
| Beirut | Karam | 521 | 56 |
| Christchurch | Wells | 1 498 | 66 |
| Taiwan | Hwu | 11 004 | 48 |
| Korea | Lee | 5 100 | 51 |

Table 3. Lifetime rates/100 of panic disorder in cross-national epidemiological samples

| | Rate/100 |
|---|---|
| ECA | 1.6 |
| Puerto Rico | 1.7 |
| New Zealand | 2.2 |
| Edmonton | 1.2 |
| Taiwan | |
| Metro Taipei | 0.2 |
| Small towns | 0.3 |
| Rural villages | 0.1 |
| Korea | |
| Urban Seoul | 1.1 |
| Rural areas | 2.6 |
| Munich | 2.4 |
| Florence | 1.3 |
| Paris | 2.7 |

the *Journal of the American Medical Association*, showing the increasing rates of depression and decreasing ages of onset, but different patterns of these changes in various countries (Cross-National Collaborative Group, 1992).

## COMING GENERATIONS

### *The fourth generation*

There are currently underway new directions in epidemiological studies. The National Comorbidity Study by Ronald Kessler has been completed and the results are now appearing. The uniqueness of this study is that it is a national probability sample, using a new diagnostic method, the Composite International Diagnostic Interview (CIDI), which is able to generate both ICD and DSM-III diagnoses. Thus, it will be possible to make direct comparisons with cross-national studies using different diagnostic criteria.

### *The fifth generation*

The first phase of the fifth generation studies, namely epidemiological studies of children, has just been completed, and the results are beginning to appear. The ECA has shown that the majority of psychiatric illnesses have their onset in childhood and adolescence. Thus, there was pressing need to

have a direct epidemiological study of children comparable to the ECA. However, it is quite clear that studies of children present even more methodological problems than those of adults. For example, should the same diagnostic criteria used with adults be used with children? Who is the best informant? Should parents, children, or both be interviewed? How young can one accurately assess psychiatric disorders? What risk factors should be included? These questions are not fully resolved. In order to obtain some of this information, pilot studies in preparation for a large epidemiological study have just been completed in New Haven, CT; New York; Georgia; and Puerto Rico. The results of this will be used in preparation for a multi-site epidemiology study of service needs and psychopathology in children.

## FUTURE GENERATIONS

The current limitations of epidemiology and psychiatric research are ones inherent in our understanding of psychiatric disorders and not in the methods themselves. As is well-known, diagnostic classifications are based on manifest criteria, rather than etiology, and the validity for most diagnoses has not been established. No biological risk factors have been unequivocally demonstrated for any of the disorders. The pathophysiology has not been demonstrated for any of the symptoms of the major mental disorders. Psychiatric disorders, like many chronic diseases, are due, undoubtedly, to more than one cause. Even in one of the most serious mental disorders, schizophrenia, where genetic heritability is partially supported by twin and adoption studies, a large part of the variance is unaccounted for. These limitations are not an end but a challenge for the development of epidemiological designs that can yield testable hypotheses. Epidemiological studies have often not proceeded beyond demonstrating a demographic range of age, sex and social class variables associated with the major mental illnesses, which do not elucidate the mechanisms by which these factors operate. There is clearly a need to integrate the search for biological markers and risk factors. All of the epidemiological studies have excluded family psychiatric history as a risk factor. Yet, there is considerable evidence to indicate that family psychiatric history is one of the most important risk factors. Inclusion of family psychiatric history needs to be part of any epidemiological survey. Most likely, it will be included in the children's study as new methods for assessing family history briefly are being developed.

There is a need both for ongoing epidemiological studies for monitoring rates as well as an integration of epidemiology with clinical research. The overlap of epidemiological and clinical research has been emphasized repeatedly by Feinstein (1985), who described epidemiology as the architecture of clinical research and defined a new collaboration, which he termed 'clinical epidemiology'. It is quite clear that the boundaries are artifactual and that there is much to be gained by a marriage between epidemiology and clinical research. A host of unreplicated biological studies could be avoided by careful attention to sampling, diagnostic assessment and the use of appropriate control groups. These concerns are the basis of epidemiological methods. Alternatively, the integration of epidemiology with clinical practice may reduce the number of well-designed epidemiological studies with findings of little utility to the health of sick people. In terms of clinical practice, epidemiological studies thus far have yielded information of direct clinical utility, which can be used by clinicians for more accurate diagnosis, early intervention and to clarify prognosis. For example, there is now an awareness that information about disorders deriving solely from patients referred to clinical practice may not represent the full spectrum of disorders and their prognosis. The clinician's sample is shown to be biased towards cases of longer duration, high comorbidity and poorer prognosis. The epidemiological studies have shown that schizophrenia is not universally a chronic, unremitting disease and that heroin abuse is not incurable. It is also shown that most of the major mental illnesses begin in adolescence and young adulthood, and that first onsets of most of these disorders are rare after the age of 50 years. Epidemiological information can sharpen clinical diagnosis and case findings, and helps to provide more accurate information to patients and their families. While our ability to identify a population, person and situation at risk for many psychiatric disorders and to provide treatment has outstripped our understanding of etiology, this is no less true in many areas of medicine.

In summary, epidemiological data have contributed to specifying the full range of disorders, their high comorbidity, variable prognoses, including information on persons who recover from the

disorders and those who do not come for treatment. These data have contributed to identifying persons at high risk for becoming ill, as well as the situations or times associated with increased risk. Recent studies have introduced diagnostic and other screening methodologies which have wide utility for improving precision and early case finding in clinical practice. However, there is still lacking a mechanism for the monitoring of rates to determine when epidemics are taking place or where there is a resolution of an illness. The feasibility and justification was noted in 1990 by Klerman: "In order to obtain truly accurate estimates of temporal changes, repeated sampling of large population groups in the range of 10 000 to 20 000 per year would be called for. Lest this be regarded as beyond practical and feasible resources, attention should be given to the extensive monitoring of labor data concerning employment status and indices of the economy. We have come to accept the importance of ongoing monitoring of the economic indices; comparable monitoring of the details of the health system are not beyond the imagination. We now monitor vital statistics, that is, birth, death, marriages, divorces, but changes in the incidence and prevalence of symptoms and disorders are now technologically feasible with advanced techniques, screenings, and diagnoses."

Our ability to understand risks for psychiatric illness and to detect underserved persons and to prevent outbreaks might be better achieved if the future generations of epidemiology research could carry out Klerman's vision.

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