Socioeconomic Status and Depressive Syndrome: The Role of Inter- and Intra-generational Mobility, Government Assistance, and Work Environment[*]

WILLIAM W. EATON,
Johns Hopkins University

CARLES MUNTANER,
University of Maryland

GREGORY BOVASSO, and
University of Pennsylvania

COREY SMITH
Johns Hopkins University

Abstract

This paper assesses the hypothesis that depressive syndrome is associated with socioeconomic status, using longitudinal data from the Baltimore Epidemiologic Catchment Area Followup. Socioeconomic measures include those used in most studies of status attainment, as well as measures of financial dependence, non-job income, and work environment. Analyses include inter-and intra-generational mobility, and replicate the basic aspects of the status attainment process, as well as psychiatric epidemiologic findings regarding gender, family history of depression, life events, and depressive syndrome. But the involvement of depressive syndrome in the process of status attainment, either as cause or consequence, is small and not statistically significant. There are strong effects of financial dependence and work environment on depressive syndrome. The findings shed doubt on the utility of the causation/selection/drift model for depression, to the extent it is based on linear relationships and socioeconomic rank at the macro level, while lending credibility to social-psychologically oriented theories of work environment, poverty, and depression.

The relationship of socioeconomic status to psychiatric disorders is one of the most important aspects of the relationship of social structure to mental life, and one of the most consistent relationships in the field of psychiatric epidemiology. Research on the issue extends back to the 19th century (Commission on Lunacy 1971), and includes classic research such as the New Haven study in the 1950's (Hollingshead and Redlich 1958) and the Midtown Manhattan Study in the 1960's (Langner and Michael 1963). Reviews of the literature show that lower class individuals, by a variety of definitions, have higher rates of mental disorders (Dohrenwend and Dohrenwend 1969; Ortega and Corzine 1990; Kohn, Dohrenwend, and Mirotznik 1998; Eaton and Muntaner 1999; Yu and Williams 1999).

The relationship of socioeconomic status to mental disorder differs depending on the definition and measurement of disorder. The inverse relationship is strongest for schizophrenia and anti-

social personality disorder. For more general constructs of mental distress and demoralization, the evidence also is consistently in favor of a strong inverse relationship between socioeconomic status and psychological disorder, or to a score on a scale of distress or demoralization (Ortega and Corzine 1990). Many scales measuring "depression" are difficult to distinguish, theoretically and empirically, from demoralization (Link and Dohrenwend 1980). Prior to 1980, the diagnoses for disorders of mood were divided into those of psychotic intensity, such as manic depressive illness (now bipolar disorder) and affective psychosis (now major depressive disorder with psychotic features), and those without psychosis, such as neurosis. The evidence was relatively clear, as early as the classic study of Faris and Dunham (1939), and continuing to the present, that manic depressive illness and affective psychosis were not associated with socioeconomic status and that schizophrenia was associated with socioeconomic status. For neurosis, which included the depressive subtype, there were studies that suggested an inverse relationship and studies that failed to observe it (Dohrenwend and Dohrenwend 1969). Except where explicitly noted, below we focus on depressive syndrome, which is a constellation of symptoms across a range of symptom types occurring together during a specified period of time. Shifting from sadness and demoralization to depressive syndrome is not trivial, as the depressive syndrome is more persistent and includes vegetative and somatic aspects that can lead to physical disorders (Pratt et al. 1996; Eaton et al, 1996), psychiatric treatment (Thase and Kupfer 1996), and disability (Judd et al, 1996).

Most studies of socioeconomic status and mental disorder present data on prevalence rates- that is, the proportion in the population with the disorder—which leaves unresolved the question of temporal order and therefore the direction of causation. This has been dubbed the "causation-selection" issue, or the "stress-selection" issue (Dohrenwend et al. 1992). There are at least four possible explanations for the cross-sectional association of lower socioeconomic status with high prevalence of mental disorder: (1) lower socioeconomic status raises risk for mental disorder, through some sort of etiologic process ("the causation interpretation"); (2) lower socioeconomic status prolongs the duration of episodes of mental disorders through an etiologic process possibly unrelated to causation ("chronicity interpretation"); (3) the mental disorder leads to downward social mobility ("drift interpretation"); or (4) the mental disorder hinders the attainment of socioeconomic status that might otherwise be expected ("selection interpretation"). All four processes can work simultaneously to produce the prevalence result. All four processes are important for understanding the effects of social structure and for alleviating human suffering connected to both low socioeconomic status and to mental disorders. Measurement of incidence—the rate at which new cases form—eliminates the chronicity, selection, and drift interpretation, allowing focus on etiology.

A complication in studying socioeconomic status is that it is influenced by family background, and that it changes over the life span. Likewise, depression ebbs and flows over the life course. Figure 1 shows these relationships in a heuristic path diagram which connects the status attainment process to the study of the transmission and natural history of depression. The top part of the figure refers to the status attainment process, and the bottom to the psychiatric epidemiologic study of depression. The important family background variables for socioeconomic status which have arisen in the literature on the status attainment process include occupational status of the main breadwinner prior to the start of the offspring's occupational career (often pegged at age 16), and educational attainment of the father, the mother, or both. Important family background variables for the study of mental disorder which have arisen in the literature on psychiatric genetics include the occurrence of the disorder among first degree relatives. Few studies of socioeconomic status and mental disorder include data on family background of mental disorder, which means that the estimations are potentially biased.

This analysis focuses on the diagonals in the figure. Study of the selection interpretation requires inter-generational data (lower left to upper right diagonal in left part of figure) and study of drift requires intra-generational data (lower left to upper right diagonal in right part of figure). Socioeconomic status can have transient effects, as shown in the nearly vertical downward arrows in the figure, and these are most probably related to acute stressors connected to the economic system. Socioeconomic status can have effects which are more extended in time, including socialization processes in childhood and youth (upper left to lower right diagonal in left part of figure), and to adult socialization processes (upper left to lower right diagonal in right part of figure). Although the figure covers the entire life span, the causal influences are probably operating most strongly during the period of young adulthood, which is the age of highest risk of onset for common mental disorders, as well as the period during which the occupational career is being formed.

DEPRESSIVE DISORDER AND SOCIOECONOMIC STATUS

It would seem logical that mood disorders, and depressive disorder in particular, would have a strong inverse relationship to socioeconomic status. Relative position in the socioeconomic structure of society should be reflected in self-esteem, a component or close correlate of dysphoria, the cardinal symptom of depressive disorder. To the extent that persons in low Socioeconomic status positions blame themselves for their status, the potential for guilt, a separate component of depressive disorder, would appear to exist (Matza 1967). Life in the lower strata of Socioeconomic status is more stressful, and stress is connected to depressive disorder (Turner, Wheaton, and Lloyd 1995). (However, the type of stress with the strongest connection to onset of depression, that is, unexpected loss of spouse or other intimate other, is not as strongly connected to Socioeconomic status as other types of stress.) Studies of status hierarchies in primates reveal that status and changes in status are reflected in hormonal differences which are known to be related to depressive disorder in humans (Jones, Stoddart, and Mallick 1995). Some Darwinian psychiatrists believe that depression is functional, in an evolutionary sense, because it expresses subordination, which is useful to the survival of the species (Gilbert 1992).

Evidence on the relationship of depressive disorder to Socioeconomic status is murky. In a recent review of 47 prevalence studies of Socioeconomic status and depressive disorder from the so-called "third generation" of psychiatric epidemiology (Kohn et al. 1998), 28 of the studies had a result that was not statistically significant, and 19 showed a significant tendency for depressive disorder to have higher prevalence in the lower Socioeconomic status group. The authors concluded that "the relationship between Socioeconomic status and depression is more complex than originally suggested from the earlier studies of non-specific distress" (p. 252). Two examples illustrate the point. The case-control studies of Brown and his colleagues (Brown and Harris 1978) showed that lower class women in London were at higher risk for clinical depression than those of the middle class, but this difference was concentrated among women in the two class strata who had young children in the home. Curiously, a later study in the same area of London failed to replicate the social class aspect of Brown et alia's work (Bebbington et al. 1981). In the Epidemiologic Catchment Area Program, prevalence data showed weak and non-significant relationships of occupation, income, and education, to major depressive disorder in the year prior to the interview (Weissman et al. 1991). However, in that study, a relatively strong relationship of depressive disorder with financial dependence on state aid (receipt of welfare, disability, or unemployment funds) was observed. A separate analysis of Epidemiologic Catchment Area prevalence data showed a weak inverse relationship to an overall measure of socioeconomic status (Holzer et al. 1986). In a national survey in Holland published after the review, DSM-III-R mood disorders (major depression, dysthymia, bipolar disorder) were higher by about 50 percent among those in the lower income and education levels (Bijl, Ravelli, and van Zessen 1998). In a cross sectional study in Ontario, also not

included in the review, occupational prestige was inversely related to depressive disorder (Turner et al. 1995).

Only a few prospective studies are available on this issue. For the early years of the status attainment process, before the age of risk for depressive disorder is complete, there are four relevant studies. A prospective study in New York (Johnson et al. 1999) revealed weak and marginally significant relationships of parental socioeconomic status to depressive disorder. The relationships were stronger for dichotomized measures of socioeconomic status such as poverty, lack of high school education, and unskilled versus skilled occupation, reminiscent of the prevalence studies cited above. This study looked for, but found no relationship of depressive disorder to later attainment. A study in New York of a sample of respondents who had relatives who were depressed (Ritsher et al. in press) found a strong relationship of socioeconomic status to early onset depressive disorder, but this relatively strong relationship might have occurred due to the high risk design, which entails a heavy weighting of depressive disorder in the parental probands—that is, it might not generalize to unselected populations. This study found no relationship of depressive disorder to later attainment, in spite of such sample selection. A prospective study in Dunedin, New Zealand (Miech et al. 1999), and another in Boston, Massachusetts (Reinherz et al. 2000), showed no effects of parental socioeconomic status on onset of depressive disorder in adolescents. The Dunedin study also demonstrated no relationship between depression and later attainment. The authors of the latter study commented that "the socioeconomic status/depression association found in some studies of adults may be specific to adulthood, reflecting the consequences of adult-specific processes" (Miech et al. 1999: 1123).

Prospective studies of the adult years are also ambiguous. Incidence data from the Epidemiologic Catchment Area showed no relationship to baseline levels of occupation and education in an analysis by Anthony and Petronis (1991), but this analysis showed that baseline unemployment predicted onset of depressive disorder during the one-year followup. Another independent analysis showed a relationship between a measure of poverty and risk for onset of depressive disorder (Bruce, Takeuchi, and Leaf 1991). These two findings suggest a non-linear aspect to the relationship of socioeconomic status and depression. Prospective data from the Woodlawn study also suggest the importance of welfare status in predicting psychological distress (Ensminger 1995). In a rural area of Nova Scotia, the rate of incidence of depression was about four times as high in the low socioeconomic status groups as in the high socioeconomic status groups; however, the sample had only 17 cases with depression (Murphy et al. 1991).

WORK ENVIRONMENTS AND DEPRESSIVE DISORDER

The socioeconomic status of adults is largely determined by their occupation, and changes in occupational status have been one focus of the status attainment model. Certainly, work is the main "adult-specific" process in socioeconomic attainment. Aspects of the work environment in some occupations are related to depression scales and to depressive disorder. Surveys of the quality of employment in the United States in 1972 revealed strong cross-sectional relationships of the construct of *job strain* to a scale of statements about life being boring, useless, hard, enjoyable, rewarding, and so forth (Karasek 1979). Job strain is derived by comparing the decision latitude an individual is able to exercise in completing his or her work to the amount of work and the time pressure to complete it: "the excess of demands over decision latitude." The job strain model has been pursued most vigorously for cardiovascular outcomes (Johnson et al. 1996); but Kohn and Schooler (1983) showed that certain aspects of the work environment, especially measures of self-direction (not too distant a concept from decision latitude), were related to various measures of distress. They interpreted this as an explanation of the socioeconomic status finding generally: "these analyses show … that the

psychological impact of social stratification position … is attributable, in very substantial degree, to occupational self-direction" (p. 187). Work environment as explanation for the socioeconomic status association is also suggested by findings from a study in Ontario, Canada in which occupation continued to be associated with depressive disorder, even after broad and general measures of stress were adjusted for (Turner et al. 1995). The connection between work environment and depression was confirmed for job discretion, and, to a lesser extent, for job demand, among men in the cross sectional part of the Whitehall study in England, with measures of sadness and hopelessness (Marmot et al. 1997).

There have been few studies of occupational environment and depressive disorder, as opposed to measures of depressive symptoms, or measures of mood or distress. In four sites of the Epidemiologic Catchment Area study there were large differences in prevalence of depressive disorder across 104 occupation groups (Eaton et al. 1990). A study of white professional and managerial employees in the United States, using measures similar to that of Karasek (Phelan et al. 1991), found quantitative workload and lack of intrinsic job rewards to be related to depressive symptomatology, but only lack of intrinsic job rewards was related to depressive disorder. Later articles connected the notion of direction, control and planning in occupational environments to the risk for depressive disorder (Link et al. 1993; 1998). A recent analysis from the Baltimore Epidemiologic Catchment Area site showed that the work environment was indeed related to depressive disorder, cross-sectionally (Mausner-Dorsch and Eaton 2000).

For women not in the formal labor force, the "work environment" is not defined by occupation, but rather by the circumstances of their daily productive activities. It is therefore of interest that single mothers, for whom the work environment is determined by the situation of being the mother of children, are at high risk for depressive disorder (Brown and Harris 1978; Muntaner and Lynch 1999; Brown and Moran 1997). Many single mothers are poor, which links to socioeconomic status. The fact that poor single mothers are often recipients of state aid payments suggests there may be a tendency for depressive disorder to be more strongly related to dichotomous forms of the socioeconomic status variable which have a threshold at or near the poverty level.

The current study presents a more comprehensive analysis of socioeconomic status and depression than has been attempted before. Measures of socioeconomic status include the standard variables used in research on the status attainment process, such as father's occupation and education, subject's education, first job, and job more than a decade after the baseline job. Measures of stressful life events are available, linking up to this strong research literature (Paykel 1994). A measure of family history of depression is included, linking up to genetically oriented studies (Weissman et al. 1984). Measures of work environment and marital status are also available. This paper presents data on prevalence of disorder, connecting to the dominant cross-sectional literature, as well as data on incidence of disorder, permitting focus on potential etiologic processes.

Below we embed the analysis of the natural course of depressive disorder within the study of mobility in the socioeconomic system. First, we establish analyses that have the capability of demonstrating and replicating the major and classical studies of socioeconomic mobility (Blau and Duncan 1967; Sewell, Haller, and Ohlendorf 1970). Likewise, we conduct analyses which have the capability of replicating the major and classical studies of depressive disorder in psychiatric epidemiology (Burville 1995). Then we address the questions of causation and selection in a longitudinal design. Finally, we introduce work environment measures into the depressive disorder/status attainment model.

METHODS

Sample

In the early 1980s, the Epidemiologic Catchment Area program interviewed more than 20,000 respondents at five study sites (Eaton et al. 1981). The target population for the Baltimore site of the Epidemiologic Catchment Area program consisted of the adult household residents of eastern Baltimore, an area with 175,211 adult inhabitants. Probability sampling methods were used to enlist 4,238 individuals for the study, of whom 3,481 (82%) completed baseline interviews (Leaf, Myers, and McEvoy 1991). A second wave of interviewing took place one year after the first, with 2,768 of the 3,481 subjects completing interviews. The second wave in 1982 is so close in time to the first that it is not used in the analyses below, except to retrieve a limited number of variables obtained only in that wave. Beginning in 1993, attempts were made to contact and interview all initial participants (Eaton et al. 1997). Of the original cohort, approximately one quarter (n = 848) had died. Of the remaining 2,633 subjects, 16 percent (n = 415) could not be successfully traced and 11 percent (n = 298) refused to participate. Personal interviews were completed with 1,920 individuals by the end of field work in 1996 (73% of survivors). Baseline depression was not related to mortality, failure to be located, or refusal to participate (Badawi et al. 1999). Respondents who did not graduate from elementary school were about 1.5 times as likely to die before followup, 2.5 times as likely to be lost to followup, and 2 times as likely to refuse to participate as those who graduated from college. Those with less than $4,000 household income at baseline were about 6 times as likely to die and 2.5 times as likely to be lost to followup (Badawi et al. 1999).

This analysis focuses on the 907 subjects who were under the age of 65 years at the followup and who reported they held a job at the time of the followup. The characteristics of the sample are shown in Table 1. The sample is 55 percent female with average age of about 43.

Measures of Socioeconomic Status

Traditional measures of socioeconomic status were included in both the baseline and followup questionnaires. Education is analyzed here as years of education completed at baseline. In the time between baseline and followup some respondents added to their educational attainment, and since education precedes the occupational career, for the most part, there could be a logic for using attainment at the followup as an independent variable. But following this logic would compromise the prospective aspect of the analysis, which is an important strength. In the discussion section we report the (mostly minimal) effects of changing this variable to include the educational attainment as reported at followup. Personal and household income were assessed at baseline and followup by asking the respondent to say which of 17 different categories, demarcated by a letter on a response card, their income fit into. The responses were then converted to percentiles (or deciles, where helpful in conveying the magnitude of the relationship) for ease of interpretation. Where the focus is on income as an indicator of the performance of the individual (status attainment as dependent variable, Tables 2 and 3), personal income is the favored indicator; where the focus is on income as a risk factor (depressive disorder as dependent variable, Table 4), household income is the preferred indicator. Table 1 shows that over 70 percent of respondents had household incomes less than $25,000 in 1981, and only 25 percent had this level of income by the time of the followup—a reflection both of inflation and upward mobility over the lifespan. The current or most recent fulltime occupation of the respondent was obtained with a series of questions used in the Labor Force Surveys, which facilitated coding into the detailed census classifications of 1980 (baseline) and 1990 (followup). These occupation categories were then assigned percentile scores using the method of Nam (Terrie and Nam 1994). At the followup interview, the respondent was asked to report the first full-time occupation in his or her life and the occupation and education of the principal breadwinner of their family of origin (respondent's age of 16);

these occupations also were coded into NAM scores. Over the course of the followup, the average job percentile changed from about 46 to about 56, which is consistent with the notion of promotion and improvement over the life course.

Measures related to different aspects of socioeconomic status were also obtained. A dichotomous measure indicated whether the respondent was currently obtaining financial assistance in the form of welfare, disability, or unemployment insurance payments. At the followup only, additional questions were added pertaining to assets, including home ownership, owning other buildings, receiving pension payments, or owning stock. These were used to create a dichotomous indicator variable called "other income." At the followup, questions were introduced pertaining to conditions at work, in the tradition of occupational psychology (Karasek and Theorell 1990; Mausner-Dorsch and Eaton 2000). Twenty-eight questions with Likert-type responses were asked about the work environment, which have been related to four factors called physical demand (e.g., "My job requires lots of physical effort"), psychological demand (e.g., "I have enough time to get the job done"), decision authority (e.g., "My job requires a high level of skill"), and hazardous work (e.g., "My job exposes me to fire, burns, or shocks"). The resulting factors have been shown to be related to depression in another analysis of these data (Mausner-Dorsch and Eaton 2000). The metric for these scales (as shown in Table 1) is arbitrary because they are based on a factor analysis unique to this dataset. Job strain was measured using an interaction of psychological demand and decision authority. Following some earlier research, we entered job strain in the analysis, but also considered its two components in terms of main effects (Muntaner et al. 1991; Muntaner et al. 1995; Mausner-Dorsch and Eaton 2000).

Measurement of Depression

The principal diagnostic survey instrument in the Epidemiologic Catchment Area Program was the Diagnostic Interview Schedule (Robins et al. 1981). Version III of the Diagnostic Interview Schedule, oriented toward the third edition of the American Psychiatric Association's Diagnostic and Statistical Manual (American Psychiatric Association 1980), was used at baseline, and third revised edition of the Diagnostic Interview Schedule, oriented toward the revision of the third edition of the Diagnostic and Statistical Manual (American Psychiatric Association 1987), was used at the followup. These versions of the Diagnostic Interview Schedule use an algorithm which produces a diagnosis of major depressive disorder (among others). The operational criteria for the diagnosis according to the Diagnostic and Statistical Manual changed slightly from baseline to followup, producing a complication in the analysis. Also, the prevalence of major depressive disorder is sufficiently low to threaten the power of our analyses to detect a relationship with socioeconomic status. There is some debate on the value of the diagnosis of depression (Mirowsky and Ross 1989). The emotion of sadness is widespread in the population, and every human being has the capacity to become emotionally sad, as well as clinically depressed. Counts of symptoms of depressive disorder are distributed continuously in the general population, and there is little empirical basis to judge where a threshold of diagnosis should be. On the other hand, there is considerable evidence that the signs and symptoms of depression covary in the general population more than is expected by chance association (Eaton et al. 1989). This clustering, which we term the *depression syndrome,* is related to important risk factors in a manner suggesting it captures the same etiological process as major depressive disorder (Chen et al. 2000). Depression syndrome is closely related to the diagnosis of minor depression (Kessler et al. 1997), but requires a two-week minimum duration. Similar to major depressive disorder, the depression syndrome is related to important outcomes (Judd et al. 1996). The depression syndrome can be operationally defined equivalently in the baseline and followup surveys: a period of two weeks or more in which sadness or loss of interest was present every day or nearly every day, and in which there were two week periods of two or more other associated problems such as problems with eating,

sleeping, concentrating, moving, unusual fatigue, unreasonable guilt, and suicidal thoughts or behaviors. In the algorithm used here, all reported symptoms are included even if the respondent discounts them due to presumed cause by medication, drugs, alcohol, physical illness, or injury. Respondents are too quick to discount symptoms in this manner, and agreement on diagnoses with psychiatrists is better if all symptom reports are included in the algorithm (Eaton et al. 2000). The two week periods of associated symptom groups must have occurred within the same month as the sadness or anhedonia. In effect, this use of the depression syndrome lowers the threshold of clinical depression from five or more symptom groups to three or more symptom groups, and requires the cluster of symptoms to occur within the month preceding the interview. The prevalence of the depression syndrome is 7–10 percent (see Table 1), which is higher than that of major depressive disorder, helping strengthen the power of the analysis.

Risk factors for depression

The models below include other important risk factors for depression in order to provide the most precise and unbiased estimation of the effects of socioeconomic status. Female gender is the most consistent risk factor for depression. Cross-sectional data consistently show a higher prevalence in females than males, usually by a factor of about two (Nolen-Hoeksema 1990; Burville 1995). Incidence data also show roughly the same relative risk (Eaton et al. 1989). A recent study used a strategy which combined incidence with analysis of recurrence and duration and found that the sex difference was confined to incidence (Eaton et al. 1997). To address the possibility that the effects of gender, socioeconomic status, and other risk factors might be differentially associated with prevalence versus incidence, models for both are included below.

Family history of depression is another consistent risk factor for depression (Weissman et al. 1984; Burville 1995). This was measured with a single question asked in the second wave of interviewing in 1982. First, the respondent was asked whether someone other than their natural parents acted as a parent for them. The question about parental depression was, "Have (either/ any) of your parents suffered from a long-lasting severe depression or from periodic short periods of severe depression—that is, when they felt so low that they hardly ate or couldn't work, or couldn't do whatever they usually did?" The reply could pertain to one or both natural or substitute parents. Coding the reply in this manner would not satisfy a geneticist, but the attempt here is to obtain a measure relevant to familial transmission, regardless of whether it is genetic or cultural. A positive response for any parent was coded as "1," and all other respondents received a "0." About one-fifth of the sample reported one or more parents with depression (Table 1). This self-report variable is subject to the influence of the current mood of the respondent (Aneshensel and Huba 1983). It is advantageous to the analysis that it was obtained in the 1982 wave of data collection, one year after the baseline, and about twelve years prior to the followup interview.

Life event stresses have also been consistently associated with depression in more than 30 studies (Paykel 1994). There has been controversy about exactly how to sample from the population of life events and how to combine the responses into a meaningful scale. The most consistent predictors of depression have been loss events in the immediate social environment, such as widowhood, illness or death of another close family member, a marital separation or divorce, or loss of a job—so-called "severe, negative" events. For each event, the respondent was asked whether it was unexpected or expected, and the number of unexpected events in the past year were included in the scale. More than one quarter of the sample had one or more of these events in the year prior to the interviews (Table 1).

Missing Data

There are data missing for some of the variables (Table 1), mostly on information about parents. Respondents were not always able to recall whether their parents had been depressed (104

missing), their father's level of schooling (221 missing), or their father's occupation when the respondent was 16 years old (191 missing). Finally, there was reluctance to report household income, especially at the followup (89 missing). These missing data sometimes combined in a disadvantageous manner to reduce the sample size for analysis, which is shown in the tables below the analytic models. Respondents included in the models below with complete data on all socioeconomic status variables (model 4 in Table 4, n = 517) were compared to those with missing data on one or more of these variables (n = 372, reduced from the residual 390 because of missing data on baseline NAM score, as in Table 1) in analyses not shown in the Tables. The prevalence of baseline depression syndrome was 7.4 percent among those with incomplete data and 6.4 percent among those with complete data. There was a tendency for those with missing socioeconomic status data to have lower baseline educational attainment (24 percent with more than high school in the group with incomplete data versus 41% with more than high school in the group with complete data) and lower baseline occupational prestige (mean NAM score of 41 in the group with incomplete data versus 51 in the group with complete data).

Analysis

The methods of analysis are linear regression for dependent variables that are continuous, and logistic regression for variables that are dichotomous. Although the analysis is unusual in bringing together variables from different fields of research (status attainment, stress, occupational psychology, and genetic epidemiology), the variables selected are traditional ones for the different fields of inquiry. The selection of variables for models was done in two stages. First, the entire list of variables was entered into the regression. Then, a best-fitting model was estimated, in which gender, parental depression, and negative life events were forced into the model, and other variables included only if their level of significance was better than the level of $p < .10$. This strategy allowed overlapping measures of socioeconomic status to be pruned, ensuring that the most important indicators would have the most statistical power. To ensure that the forced entry of gender, parental depression and negative life events did not prematurely eliminate socioeconomic variables, models with these variables excluded were also examined. In the model predicting depression at followup, baseline depression was not included in the prevalence model, to maximize the potential contribution of socioeconomic status variables; in the incidence model, respondents with baseline depression were removed from the sample at risk.

RESULTS

The first analysis introduces depressive syndrome into the early process of status attainment, focusing on intergenerational mobility (Table 2). In models adjusting for father's grade level and parental depression, the percentile rank of the occupation of the father when the respondent was 16 years of age predicts the percentile rank of the first full-time job the respondent had ($\beta = 0.20$), the highest grade achieved by the respondent ($\beta = 0.17$), and the percentile rank of the job the respondent had at the baseline interview ($\beta = 0.13$). Neither father's job, father's education, nor parental depression has an effect on personal income. A logistic regression analysis (far right column), shows that each percentile of father's job status lowers the risk that the respondent will be financially dependent on direct state aid at baseline. These results are consistent with expectations generated from the literature on occupational mobility.

Indicators of early status attainment, from baseline, are highly predictive of later attainment, in models focusing on intragenerational mobility (Table 3), but they rob the family background variables of predictive power, as might be expected. Baseline grade level, percentile of the first job, percentile of the baseline job, and financial dependence at baseline were all strong and significant predictors of the job percentile at followup (β's of 0.22, 0.12, 0.27, and −0.14, respectively). Baseline education, percentile of first job, and personal income predicted

strongly and significantly to income at followup (β's of 0.15, 0.12, and 0.36, respectively). Financial dependence at followup was strongly predicted by financial dependence baseline (OR of 4.32) and by personal income (OR = 1.10), but not by other baseline variables. Receiving financial aid at baseline was negatively associated with having other income at followup, and job percentile and personal income at baseline were positively associated with having other income at followup.

Depressive syndrome does not play an important role in the process of status attainment in these analyses. The estimates adjusted for Socioeconomic status and other predictors are presented in Table 3, which shows that the effects of parental depression are trivial (with the possible exception of the non-significant effect of depression at baseline on financial dependence at followup, OR = 1.95). Depressive syndrome at baseline has small and non-significant effects on all four measures of status attainment at followup. The weakness of these relationships is not due to overadjustment. The bivariate relationship of depressive syndrome at baseline to job percentile at followup was weak and not statistically significant (β = −0.05, not shown). Depressive syndrome had a small negative effect on income percentile at followup (Bivariate β = −0.10, significant at $p < .01$, not shown). In bivariate analysis, the effect of depressive syndrome doubled the odds of financial dependency at followup, but the odds ratio (not shown) was not significant. Depressive syndrome at baseline lowered the odds of having other income at followup in bivariate analysis (OR = 0.57, $p < .05$, not shown).

What role does socioeconomic status play in the natural history of depressive syndrome? Table 4 shows models for cross-sectional association at baseline and followup, and prospective analyses in which the dependent variable is the total incidence of depressive syndrome. At baseline the background variables are first analyzed separately (column 1), and then a more complete, best-fitting model is estimated (column 2). Females, those with recent negative life events, and those with a depressed parent, each had about twice the odds of being depressed as men or those with no negative life events. Father's occupation and father's grade level had trivial and non-significant effects (not shown), and these variables were not included in the best-fitting baseline model shown in Table 4, in order to maximize power and sample size for the remaining variables. Other socioeconomic characteristics of the respondent are not important, except that financial dependence was associated with about a threefold odds of depression at baseline.

The prevalence of depressive syndrome at followup is associated with background variables, socioeconomic status, and stress in bivariate estimations (column 3 of table 4). The direction and size of the bivariate associations are consistent to some degree with prior literature, both in status attainment and psychiatric epidemiology. Household income at baseline and followup, baseline job, and baseline education are associated with depression in a statistically significant manner. The adjusted prevalence model at followup (column 5) is similar to the baseline model, in that being female, having a depressed parent, having recent negative life events, and financial dependence at baseline are associated with higher prevalence of depressive syndrome. Psychological demand of the occupation was also associated with higher prevalence of depression. None of the socioeconomic status variables had a strong enough relationship to depression to enter the model. Column 4, entitled "SES only," was designed to maximize the potential contribution of socioeconomic status variables, by excluding variables not arising directly out of the status attainment literature: gender, parental depression, life events, and working conditions. Following this logic, two socioeconomic status variables from the followup with significant contributions were eliminated for this purpose because they were not part of the research literature which, some might say, is contradicted by these results: financial aid from the state, whose estimated odds ratio in a more complete socioeconomic status model would have been 3.00 (significant at the .05 level); and other income, whose estimated odds ratio in a more complete socioeconomic status model would have been 0.34, significant at the .

01 level.) Even in this constrained model, the estimated odds ratios are all either nearly or even exactly 1.00, and none are statistically significant. The small size of the coefficients is not a consequence of the scaling of the NAM and income predictors (into percentiles, except household income which had insufficient dispersion and was scaled in deciles). Models estimated with decile scaling likewise show coefficients of trivial size (not shown).

Among the variables describing the characteristics of the work environment, psychological demand is associated with higher odds of depression: Each unit of the scale of psychological demand raises the odds of depression about 25 percent (coefficient of 1.29 in column 5). Neither hazardous work conditions nor physical demand were associated with depressive syndrome (not shown). Job strain, whether operationalized via the interaction of psychological demand and decision authority or physical demand and decision authority, did not have an important or significant influence (not shown).

The incidence model is shown at the far right of Table 4. There were 845 individuals who were not depressed at baseline, of whom 693 had complete data on the relevant variables. These form the cohort at risk for total incidence, defined as the new occurrence of the disorder among persons free from it at baseline (Kleinbaum, Kupper, and Morgenstern 1982). The model is very similar to that for prevalence, with moderate or strong risk-enhancing effects for gender, parental depression (OR = 1.42, not quite significant), negative life events, prior financial dependence, and psychological demand in the work environment.

DISCUSSION

The analysis shows that depressive syndrome is not strongly involved in the process of status attainment, as traditionally conceived, either as cause or consequence. As a *cause,* parental depression has little effect on the early attainment process, and depressive syndrome at baseline has no effect on later status attainment. This failure to predict is *not* the result of weak measurement of socioeconomic indicators, since the analysis replicates in some detail the usual features of the status attainment process, such as the relationship between parental background variables and early attainment and the relationship of indicators of early attainment with later attainment. Nor is the failure due to weak measurement of depression. The operations of measurement used here have been successful in other analyses (Chen et al. 2000). Finally, the weak relationship of socioeconomic status to depression is not due to low statistical power, since the analysis replicates the most important findings in the psychiatric epidemiologic research literature on depression; that is, the relationship to family history of depression, and to the recent occurrence of negative life events.

Depressive syndrome is also not strongly involved as a *consequence* of socioeconomic attainment, with results that are almost dramatic in their smallness. An exception is the measure of receiving state aid payments, which is strongly associated with depressive syndrome cross-sectionally, as well as predictive of it longitudinally. It is not completely clear that this effect is causal, since persons prone to depression could have selected themselves into financial dependence before the baseline interview. The incidence analysis shows that financial dependence is temporally prior to depressive syndrome, and thus possibly causal; however, the measure of incidence includes individuals who were having recurrent episodes of depression (the requirement being only that they not be in an episode at baseline). It could be that depressive individuals were temporarily in remission when answering the baseline questionnaire, and that a depression-prone personality is causally related to becoming financially dependent. However, depression proneness ought to have been measured by a family history of depression, and this variable was related to depressive disorder. The incidence results, as well as the failure of the control of family history to eliminate the effect, suggests that financial dependence be considered as a cause of depressive disorder.

The credibility of our conclusions is limited by certain aspects of the analysis. As with any cohort study, the sample has suffered attrition over time. Our analyses suggest attrition is related to low socioeconomic status, but not to depression. Similarly, we have important patterns of missing data, which appear to be related to low socioeconomic status, but not to depression. It is possible that the resulting bias in the sample has led us to underestimate the effects of socioeconomic status on depression. This argument would be more persuasive if the attrition and non-response were also associated with depression. Extrapolation of these results to other samples representing higher or lower socioeconomic status populations may be problematic. A related limitation is that we include in the analysis only persons in the workforce, a strategy which excludes those whose socioeconomic status is low because they are unemployed, disabled, or retired (before the age of 65 in this sample). Although unemployment predicts depression, and depression is cross-sectionally associated with unemployment, the literature is by no means clear that depression is followed by unemployment (Ettner, Frank, and Kessler 1997). Our analysis of this possibility (not shown) suggests that depression at baseline was not strongly predictive of exits from the labor force, even though other socioeconomic status characteristics at baseline, such as educational attainment, were related to labor force exits in the expected direction. Nevertheless, the direction of this bias is also to undersample those at the low end of the socioeconomic status continuum, and thus possibly underestimate the effects of socioeconomic status on depression.

Another possible limitation is our use of baseline education as predictor, possibly neglecting educational attainment between baseline and followup, which might be important for young persons. We chose this variable instead of educational attainment at followup to ensure the temporal order, that is, from education to depression. However, models using educational attainment at followup were not qualitatively different than those shown in Tables 3 and 4.

These findings add to the research literature but do not contradict it directly. There are many cross-sectional studies with significant bivariate relationships such as shown in column 3 of Table 4. For example, several studies show that depression is related to impairment on the job and absence from work (status attainment is not analyzed in these studies) (Kouzis and Eaton 1995;Judd et al. 1996;Kessler and Frank 1997). Analyses from the National Comorbidity Study suggest that early depression reduces the probability of high educational attainment. An early analysis suggests that persons with mood disorder are more likely not to complete high school, if they enter; and college, if they enter college (Kessler et al. 1995). In this analysis there were few adjusting variables, and the data on depression and finishing college were obtained by retrospective recall, with the order of events determined by the respondent's memory. It seems possible that at least a few respondents who were depressed at the time of the interview might order the two variables in such a way that the depression would occur before the failure to complete college, in effect, offering an explanation for it. A later study of men only from the National Comorbidity Study resembles this one in that it controls for family background, including parental disorder. It suggests that the probability of finishing college may be actually greater for men who have early depression (odds ratio of 1.08, not statistically significant) (Jayakody, Danziger, and Kessler 1998). The few longitudinal studies of socioeconomic status and depressive disorder obtain results similar to ours, though perhaps not as rich in details of the status attainment process; nor do they have as long a followup, which gives adequate time for relationships to develop between socioeconomic status and depression. The prior longitudinal studies also find a predictive relationship between socioeconomic status variables indicating a position at the extreme low end of the socioeconomic status continuum (poverty in Bruce et al. 1991; unemployment in Anthony and Petronis 1991) and depressive disorder.

Depressive syndrome is related to the work environment in a statistically significant way, and in accord with predictions from some of that research literature. This part of the analysis is only cross-sectional, since the work variables were not available for the baseline, but it is

relatively independent of socioeconomic status, family history of depression, and negative life event stresses. The decision authority factor, among our variables the most closely related to the notion of direction, control, and planning (Link et al. 1993), was not associated with depression. Our measure of physical demand, which is highly correlated with low socioeconomic status, was not related to depressive syndrome. The characteristic of the work environment that is apparently generating the high risk has to do with the pace of work: *psychological demand.* Psychological demand can occur in a variety of occupations, located at various places along the spectrum of occupational rank. In this sample, the correlation of psychological demand with years of education is positive and significant (r = .12), indicating slightly more demand for those with higher education. The correlation of psychological demand with occupational percentile at followup is small and not significant (r = .04).

The implication is that, in understanding risk of socioeconomic factors for depressive disorder, it would be wise to shift the conceptual framework from *status attainment* to *psychosocial environment.* This shift will lead logically to a shift in the importance and meaning of the causation-selection controversy, in that the etiologic forces will be less closely tied to rank in the system of socioeconomic stratification at the macro level, and the selective forces will be less involved with mobility in this socioeconomic system. The results suggest that the causation-selection approach, to the extent it is based on continuous measures of mobility and rank, may not be the most useful way to understand the relationship of the system of social stratification to depressive syndrome.

Although status attainment may not be strongly related to depression all along the status continuum, the situation of working very hard for little reward—extreme poverty combined with high job demand—is related to depression. Aspects of the environment that are common to psychological demand in the workplace may be similar to the psychological feeling of being trapped in a punishing situation, a central concept in some current models for life event stress and onset of depression (Brown, Harris, and Hepworth 1995) and closely related to models of depression based on helplessness and hopelessness (Abramson, Alloy, and Metalsky 1989; Seligman 1975). In women with onset of depression in London, 34 percent were rated as having an event which signaled entrapment in the context of ongoing difficulty, as compared with 3 percent, for example, who had an event signaling danger alone (Brown et al. 1995). Another major risk group for depressive disorder is single mothers living in poverty (Hall, Williams, and Greenberg 1985; Orr et al. 1989; Brown and Moran 1997; Heneghan et al. 1998). For this group the analogue to the work environment may entail the same type of persistent time pressure and psychological demand as measured by the work environment variables analyzed above. This risk group of single mothers living in poverty may be highly overlapping with mothers reporting financial dependence, possibly explaining the relationship of that situation with depressive disorder. It is difficult to test this notion in detail with the current data set, since we have no measures of the work environment for mothers in our sample who were not in the formal workforce—a distinct limitation in our questionnaire design. Further research is required to fully explore these possibilities.

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Biographies

William Eaton is Professor in the Department of Mental Hygiene at the Johns Hopkins University Bloomberg School of Public Health. He has recently published the third edition of his *The Sociology of Mental Disorders.*

Carles Muntaner is Associate Professor in the Department of Behavioral and Community Health, School of Nursing at the University of Maryland. His interests are in the structure of the system of social stratification and its effects on health and mental health.

Gregory Bovasso is Research Assistant Professor, University of Pennsylvania Treatment Research Center, in Philadelphia. He is interested in applications of social psychology to the problems of drug use and mental health.

Corey Smith is Research Associate in the Department of Mental Hygiene of the Johns Hopkins University Bloomberg School of Public Health. His interests are in the relationship of religiosity to health and mental health.
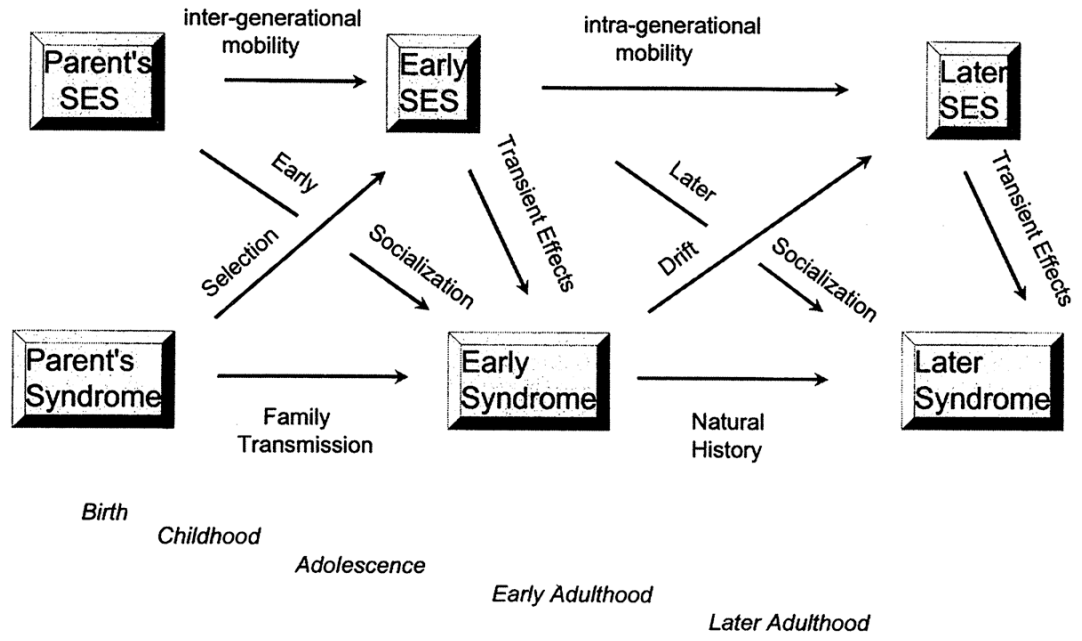
FIGURE 1.
Socioeconomic Status and Psychopathology Inter- and Intra-generational Models.

TABLE 1

Sample of Employed Adults Baltimore Epidemiologic Catchment Area Followup

Categorical variables:	Percentage	Frequency
Male	44.9	407
Female	55.1	500
Depression syndrome at:		
Baseline	6.8	907
Followup	9.8	907
One or more life events at:		
Baseline	27.6	907
Followup	43.6	907
One or more parents depressed	20.3	803
Financially dependent at:		
Baseline	12.9	907
Followup	5.2	907
Other income (followup)	70.1	907
Less than $25,000 household income at:		
Baseline	72.9	853
Followup	25.8	818
Continuous variables:	Mean	Frequency
Age	43.2	907
Fathers characteristics		
Job percentile	47.6	716
Years of school	10.1	686
Subject's early characteristics		
Years of school	12.4	907
First job percentile	39.9	866
Baseline job percentile	46.6	889
Subject's followup characteristics		
Job percentile	56.3	871
Job physical demand	17.5	871
Job psychological demand	7.5	871
Job decision authority	8.9	871

Note: Frequencies are for those subjects with complete data on the variable

TABLE 2

Predictors of Early Indicators of Socioeconomic Status Baltimore Epidemiologic Catchment Area Followup

| | Prior to Baseline | Baseline | | | |
| | Standardized Regression Coefficients | | | | Odds ratios |
Variable	Percentile of First job	Highest grade	Percentile of job	Personal Income	Financial Dependence
Father's job percentile	.20†	0.17†	0.13***	0.05	.99**
Father's grade level	0.14†	0.23†	0.10**	−0.01	.95
Parental Depression	0.02	0.03	0.00	−0.01	1.35
R-squared	0.08	0.11	0.04	0.0	NA
Sample size	538	543	534	532	544

*
p < .1;

**
p < .05;

***
p < .01;

†p < .005

TABLE 3

Predictors of Later Indicators of Socioeconomic Status Baltimore Epidemiologic Catchment Area Followup

	Job Percentile	Income Percentile	Financial Dependence	Other Income
	Standardized Regression Coefficient:		Odds ratios	
Background characteristics				
Father's job percentile	.05	−0.08[*]	1.00	1.01
Father's grade level	0.01	−0.02	1.02	0.98
Parental Depression	−0.02	−0.07	1.60	0.88
Early Socioeconomic Attainment				
Baseline grade level	0.22[†]	.15[†]	1.03	1.01
Percentile of first job	0.12[***]	.12[**]	1.00	1.01[**]
Baseline SES				
Percentile of baseline job	0.27[†]	0.10[**]	0.99	1.01
Personal income percentile	0.01	0.36[†]	1.10[**]	1.08[†]
Financial dependence	−0.14[†]	−0.03	4.32[†]	0.46[**]
Baseline Psychopathology				
Depressive syndrome	−0.04	−0.03	1.95	0.73
R-squared	0.32	0.30		
Sample size	518	436	521	521

[*]
p < .1;

[**]
p < .05;

[***]
p < .01;

[†]p < .005

TABLE 4

Predictors of Episode of Depressive Syndrome Baltimore Epidemiologic Catchment Area Followup

	Baseline (1981)		Bivariate	Followup (1993–96)		
	Background	Prevalence		SES only	Prevalence	Incidence
Family Background						
Father's job percentile	—	—	1.00	1.01	—	—
Father's grade level	—	—	0.94	0.96	—	—
Female	2.16**	1.85*	3.58†	—	3.37†	4.95†
Parental Depression	1.94†	1.85***	1.77†	—	1.51*	1.42*
Prior Occupational Career						
Baseline grade level	—	—	0.87***	0.88	—	—
Percentile of first job	—	—	0.99	1.00	—	—
Percentile of baseline job	—	—	0.99**	1.00	—	—
Household income percentile, baseline		—	0.88†	0.93	—	—
Financial dependence at baseline		2.90†	3.30†	—	3.07†	2.49***
Associations with followup variables						
Household income percentile, followup	—	—	0.99†	1.00	—	—
Job percentile, followup	—	—	1.00	1.00	—	—
Psychological Demand	—	—	1.24†	—	1.29†	1.20*
Prior year Life Events	1.95**	1.65*	1.92†	—	1.57**	1.58**
Sample size	803	751	686–907	517	735	693

*
p < .1;

**
p < .05;

***
p < .01;

†
p < .005