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"Lifetime Psychiatric Symptomatology and Earnings"

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LIFETIME PSYCHIATRIC SYMPTOMATOLOGY AND EARNINGS

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ABSTRACT

Why some individuals earn more than others has long been a focus of concern. This study brings to bear on the issue new kinds of data collected in a recent epidemiologic study of the general population. For the first time, lifetime histories of psychiatric symptomatology for individuals in the general population can be linked to their educational attainment, current earnings, and occupation.

The data used are from the NIMH Epidemiologic Catchment Area program, which administered a highly structured diagnostic interview to over eighteen thousand household respondents in the general U.S. population. Respondents' demographic characteristics, employment, and current earnings or income were also ascertained. The analysis here is based on the St. Louis subsample of 2426 respondents between the ages of 18 and 64.

Educational attainment as a source of differentials in earnings can be examined from a new perspective through these data. A model is developed which estimates schooling attainment as a function of demographic characteristics, family background, and psychiatric symptomatology before age 16. Adult earnings are then estimated as a function of these early characteristics and schooling, plus the other standard human capital variables. Lifetime psychiatric diagnoses and recent symptoms are incorporated in expanded specifications.

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I. INTRODUCTION

This investigation is motivated by the question of why some individuals earn more than others. What is intriguing about psychiatric disorders in this context is that for many disorders, such as antisocial personality, symptoms frequently begin early in life. This early onset may have important consequences for individuals' educational attainment and earnings. What makes the psychiatric issue especially interesting is that psychiatric disorders are widespread in the general population[1] and have been relatively unexamined in this context.

The human capital literature in economics - the main literature concerned with the distribution of earnings - has firmly established the relationship of economic achievement to education and job experience. It treats educational attainment as a choice variable representing an individual's investment to reap future earnings, and emphasizes the rate of return on that investment. It has less systematically explored the determinants of educational attainment: why some individuals obtain more education than others is only weakly understood.

Data from a recent epidemiologic study of the general population allow a new examination of these issues. Psychiatric disorders and the timing of the onset of symptomatology can be incorporated into a human capital model of earnings to investigate further how much economic achievement can be predicted, and how early.

II. PREVIOUS WORK

For several decades, psychiatric epidemiologists and sociologists have explored the relationship between socioeconomic status and mental disorders and have found that psychiatric disorders are disproportionately concentrated among lower socioeconomic groups.[2]

Economists' approaches to the investigation of psychiatric disorders have included estimates of the aggregate economic impact of mental disorders (Cooper and Rice, 1976) and the economic cost of alcoholism (Berry and Boland, 1977). In recent years studies of income and earnings inequality have speculated on the role of health and family background characteristics.

Bartel and Taubman (1979) examined physical and mental health and earnings in a sample of white veteran male twins. Disease information was collected from several sources, including the V.A., military records, and questionnaires mailed to the subjects. All mental disorders were combined into one category. On average, the wage rate was 18% lower and the probability of being out of the labor force 5% higher for individuals classified as having mental disorders.

Benham and Benham (1982) explored the issue of psychiatric disorder, education, and earnings using data from Lee Robins' study, <u>Deviant Children Grown Up</u> (1966). Robins' study utilized a sample of child guidance clinic patients in the 1920s who were located and re-examined 30 years later, plus a set of matched controls. Interview data were supplemented by school records, military records, police files,

and information from hospitals, relatives, credit bureaus, and other sources. Diagnoses were made on the basis of criteria for sociopathy developed by Robins and criteria for other disorders derived from <u>The Diagnostic and Statistical Manual, Mental Disorders, 1952</u> and various clinical follow-up studies (Wheeler et al., 1950). Benham and Benham observed substantial variation in educational attainment associated with psychiatric diagnosis. Individuals with diagnoses of psychosis, sociopathy, or alcoholism completed on average 2.6 fewer years of schooling than individuals with no psychiatric disorder. Earnings and employment also varied substantially by diagnosis. Although the size and the specialized nature of this sample limit the economic generalizations which can be drawn, the life cycle information and standardized diagnostic ratings provide a rich source for investigation. The current analysis is motivated by these earlier results.

A subsequent study by Bartel and Taubman (1986) used three categories of mental illness - psychoses, neuroses, and other mental illness - based on the 1965 International Classification of Diseases criteria. Using social security panel earnings data, again for a sample of white veteran male twins, they estimated that earnings were approximately 32% to 47% lower for psychotics and 12% to 14% lower for neurotics. Standardizing for psychiatric disorder, they found the effect of education on earnings was approximately 10% of the effect normally observed. This suggests either that psychiatric health status captures most of the education effect, or that the problems associated with truncation of earnings in these data were so severe that the education effect was missed.

These studies suggest a significant relationship between psychiatric disorders and earnings, but data limitations have restricted the questions which could be addressed and the generality of the results. The data were not obtained from general population samples, the diagnostic protocols were frequently not standardized, and information concerning psychiatric health status over the life cycle was quite limited. None of the studies examined the relationship between early onset of symptoms, schooling attainment, and subsequent earnings.

III. MODEL

To obtain parameter estimates of the relationship between earnings and lifetime patterns of psychiatric symptomatology, we build on the standard human capital model of labor economics. This standard model represents earnings as a function of age, schooling, job experience, marital status, race, and sex. Our general strategy is to modify this model by incorporating psychiatric symptomatology and other individual and family information chronologically into a two-equation recursive model. Birth cohort, race, measures of family background, and psychiatric symptomatology early in life are used to estimate schooling attainment; all these variables plus schooling, labor force experience, marital status, physical health status, and lifetime and recency measures of psychiatric health status are then used to estimate adult earnings. Since the labor force participation and earnings of males and females differ, estimates will be done separately by sex. (Some estimates below are shown for males only.)

The general form of the model is

$$S_i = a_1 I_i + b_1 F_i + c_1 C_i + u_i$$

$$\ln Y_i = a_2 I_i + b_2 F_i + c_2 C_i + d_2 S_i + e_2 E_i + f_2 E_i^2$$

$$+ g_2 H_i + h_2 M_i + v_i$$

where, for individual i,

S_i = years of schooling completed

I_i = vector of initial attributes of the individual (e.g., race, birth cohort)

F_i = vector of attributes of the parental family (e.g., family stability, economic position)

C_i = vector of early psychiatric symptomatology (e.g., occurrence of symptoms before age 16 , age at earliest occurrence,)

Y_i = earnings (measured alternatively as current full-time earnings or as estimated permanent earnings of occupational group)

E_i = job market experience

H_i = current physical health status

M_i = current marital status

u_i = error term

v_i = error term

and a_1, b_1, c_1, a_2, b_2, c_2, d_2, e_2, f_2, g_2, and h_2 are constants.

The first equation focuses on the relationship between educational attainment and early psychiatric symptomatology. In Robins' sample examined by Benham and Benham (1982), individuals with no psychiatric diagnosis had on average over 2.6 years more schooling than individuals diagnosed as psychotic, sociopathic, or alcoholic. This suggests the possibility of a large and significant relationship between early psychiatric symptomatology and schooling attainment.

A secular increase in schooling attainment has occurred across generations in the U.S. Schooling attainment also varies systematically by race and by parental family characteristics. We include variables to control for these effects.

The second equation estimates current earnings as a function of psychiatric symptomatology in childhood plus the standard human capital variables.

Studies estimating the determinants of earnings constitute one of the largest sets of studies in empirical economics [Rosen, 1977]. Within that literature, schooling is perhaps the most systematic determinant of earnings examined. A strong positive association is to be expected between schooling attainment and current earnings.

Earnings generally increase with years of experience in the labor force to a certain point, and then decrease in later stages. This relationship is usually approximated by a quadratic form: experience plus experience squared.

Several studies of self-reported physical health status have found lower earnings to be associated with poorer physical health.

For men, marital status is strongly associated with earnings. The earnings of married men are substantially higher than those of single and divorced men. Married women do less well comparatively than unmarried women.

Race is included to reflect differences in earnings patterns by race in the U.S. Parental family characteristics included in the schooling equation are also included here.

Because this model has a recursive structure, the coefficient estimates describe the direct association of early psychiatric symptomatology with earnings and also allow us to calculate the indirect association via schooling attainment.

An expanded model can be developed which incorporates lifetime psychiatric measures and recency of psychiatric symptoms. This expanded model includes

L_i = lifetime psychiatric health status (e.g., number and type of lifetime diagnoses, number of lifetime symptoms)

and R_i = recency of psychiatric symptoms (e.g., presence of any symptoms within the past year)

as additional independent variables in the earnings equation.

Given the current state of knowledge, it is inappropriate to assert an exact specification of the relationships a priori, and it is very important to test for robustness. We will examine the sensitivity of parameter estimates across variations of the basic structural model, across measures of the dependent variable, and eventually across the various survey sites.

IV. DATA

The data used to test this model come from the Epidemiologic Catchment Area program, which was designed to study the prevalence and incidence of specific mental disorders in the general U.S. population. In collaboration with the Division of Biometry and Epidemiology of the National Institute of Mental Health, independent research teams at Yale, Hopkins, Duke, Washington University, and UCLA participated in the study. The data were collected during 1980-85 for approximately 18,500 household respondents in the general population.[3]

Respondents were interviewed using the Diagnostic Interview Schedule (Robins et al., 1981), a highly structured interview designed to elicit lifetime histories of the symptoms used to make diagnoses according to the DSM-III criteria of the American Psychiatric Association. The instrument was designed to be used by lay interviewers in epidemiologic studies. Its validity has been extensively studied. Helzer et al. (1985) found that overall agreement between lay-administered DIS interviews and psychiatrists' independent clinical assessments ranged between 79% and 96%. The demographic characteristics, occupation, employment status, and earnings or income of respondents were also ascertained.

Approximately one year after the initial (Wave 1) interview, a second (Wave 2) interview was administered to respondents.

Data from the St. Louis site are used for the analysis shown below. Because this investigation focuses on labor force characteristics, analysis is restricted to the subsample of respondents who were between the ages of 18 and 64 at the time of the initial interview. In the St. Louis sample, 2426 respondents meet these criteria. Table 1 indicates that, except for intentional overrepresentation of nonwhites, the demographic and employment characteristics of the St. Louis subsample are very similar to those of the U.S. as a whole.

a. Economic Variables

Several measures of earnings are available for the St. Louis sample, including current earnings reported in Wave 1 and in Wave 2. Respondents' answers to the question in Wave 1:

"How much do you make on (all) your job(s) now--before taxes or other deductions?"

were recorded verbatim. These reported earnings vary by respondents' age, education, and occupation in similar fashion to the 1980 U.S. Census data. (See Appendix, Table A1.) Analysis of these earnings will be restricted initially to respondents who worked full-time at least 50 weeks during the previous year.

An economics literature going back several decades deals with permanent versus transitory components of current earnings. It is well understood that in any particular

TABLE 1

DEMOGRAPHIC CHARACTERISTICS OF WEIGHTED ST. LOUIS SUBSAMPLE[a]
AND 1980 U.S. CENSUS POPULATION[b]

| | St. Louis Subsample | | U.S. Census | |
	Males	Females	Males	Females
Sex				
Male	(48% of sample)		(49% of population)	
Female	(52% of sample)		(51% of population)	
Race				
White	78%	75%	85%	84%
Nonwhite	22	25	15	16
Age				
18-24	21%	21%	22%	21%
25-39	39	39	38	37
40-54	25	25	25	25
55-64	15	15	15	17
Years of school completed				
Less than 12	28%	31%	27%	26%
12	29	40	36	43
13-15	25	19	19	19
16 or more	16	10	19	13
Marital status				
Married, spouse present	58%	54%	63%	63%
Never married	25	20	27	20
Other	17	26	11	17
Median age, in years	34	34	35	35
Median schooling, in years	12	12	12	12
Mean weeks worked				
full-time last year	40.8	24.8	41.2[c]	26.7[c]

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[a]St. Louis ECA household respondents of ages 18-64.
[b]All persons of ages 18-64.
[c]For ages 20-64.

year an individual's earnings may be transitorily low or high as compared with usual or "permanent" earnings, because of unemployment, underemployment, or an increase in demand in the individual's field.

Proxies for long-term earnings which avoid some problems of transitory high and low earnings can be constructed using characteristics of the respondent's occupation. Current (or most recent) and principal occupation were recorded for respondents. The distribution of occupations reported in the St. Louis subsample appears broadly similar to that for the U.S. as a whole. (See Appendix, Table A2.) Average earnings by occupational category from the 1980 U.S. Census can be used to proxy respondents' permanent earnings.

An investigation of the stability of current earnings can also be conducted by comparing Wave 1 and Wave 2 earnings, collected approximately one year apart.[4] In addition, we can estimate the probability that an individual has positive earnings during the current year.[5] The sensitivity of the estimates with respect to these alternative measures can be examined.

b. Psychiatric Variables

Symptomatology associated with fourteen psychiatric disorders will be considered. These disorders are organic brain syndrome, schizophrenia, schizophreniform disorder, manic episode, major depressive episode, dysthymia, somatization, alcohol abuse and/or dependence, drug abuse and/or dependence, antisocial personality, obsessive compulsive disorder, panic disorder, phobia, and anorexia nervosa.

For each respondent, several measures of psychiatric health status can be computed, including the total number of symptoms, the total number of lifetime diagnoses, and the presence of specific lifetime diagnoses. A positive lifetime diagnosis of a disorder is given if the respondent ever in lifetime met full criteria for that diagnosis.[6] The lifetime prevalence of disorders in the St. Louis subsample is summarized below.

In addition, if a respondent endorsed some symptoms associated with a given disorder, the respondent was asked the earliest age at which any of those symptoms began, and the most recent time at which any occurred.[7] From these individual measures, we construct for each respondent a summary measure - across all disorders - of the earliest age at which any symptomatology was reported to occur. (This measure does not in principle require the existence of any positive lifetime diagnosis.) The occurrence of symptoms before the age of 16 is of particular interest in this study. A similar variable can be constructed to indicate the most recent time at which a respondent reported experiencing any psychiatric symptoms.

c. Other Variables

Sex, age, race, years of schooling completed, marital status, physical health status, stability of family composition during respondent's upbringing, and parents' occupations are also available in the St. Louis data.

V. RESULTS

Estimates of the education equation are shown in Table 3. Early occurrence of psychiatric symptoms is significantly associated with fewer years of schooling completed. For example, those with symptoms by age 5 completed 1.23 fewer years of schooling than did those reporting no symptoms before age 16, ceteris paribus (regression 1). Those whose first symptoms occurred between ages 11 and 15

TABLE 2

LIFETIME PREVALENCE OF PSYCHIATRIC DISORDERS
IN WEIGHTED ST. LOUIS SUBSAMPLE[a]

	Males	Females
Percent of respondents with no diagnosis	60%	71%
Percent of respondents with diagnosis of[b]		
Anxiety disorders[c]	8	16
Affective disorders[d]	4	12
Alcohol abuse and/or dependence	30	5
Drug abuse and/or dependence	8	5
Antisocial personality	10	2
Organic brain syndrome	3	3
Schizophrenic and schizophreniform disorders	1	1

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[a]St. Louis ECA household respondents of ages 18-64.
[b]Individuals can have multiple diagnoses.
[c]Obsessive compulsive disorder, panic disorder, and phobia.
[d]Manic episode, major depressive episode, and dysthymia.

completed .66 fewer years of schooling than those with no symptoms before age 16, ceteris paribus.

In Tables 4 and 5, reported current earnings are used as the dependent variable. For these regressions the sample is restricted to those working full-time 50+ weeks the previous year. The standard human capital variables have coefficients in the expected range. The estimated rate of return on education is 4% per year of schooling. Earnings of nonwhites are approximately 16% less than those of whites, (Table 4, regressions 1 and 3) or approximately 12% less when marital status is included (Table 5, regression 1). Earnings increase at a decreasing rate with experience, and never married persons earn approximately 22% less. In these estimates, earnings are not significantly related to psychiatric symptomatology by age 15, nor to lifetime psychiatric diagnoses, nor to experience of psychiatric symptoms within the past year.

In Tables 6 and 7, mean 1980 Census earnings by occupation are used as proxy for respondents' permanent earnings. These tables are estimated for all respondents of ages 18-64 for whom an occupation was recorded, including those not working full-time last year. One noteworthy difference here from the estimates based on current earnings is the significance of early symptoms shown in Table 6, regression 2. However, when education is included (regression 3), the systematic negative associations disappear. In these specifications, the only lifetime diagnoses significantly related to occupational earnings are the affective disorders, which were not significantly related to current earnings.

VI. CONCLUSIONS

From the analysis so far, two principal findings appear. First, psychiatric symptomatology in childhood is significantly negatively related to respondents' educational achievement. Second, almost no statistically significant direct associations were found between measures of psychiatric symptomatology and adult earnings. In this model, the association of psychiatric disorders with earnings is solely an indirect one through educational attainment.

The latter result was unanticipated. It differs markedly from the findings of previous studies, which have consistently shown large and significant associations between earnings and psychiatric diagnoses.

TABLE 3
YEARS OF SCHOOLING COMPLETED
AS A FUNCTION OF BIRTH COHORT, RACE, FAMILY STRUCTURE,
AND PSYCHIATRIC SYMPTOMATOLOGY BY AGE 15[a]

Independent Variable	Regression	
	1	2
Age	-.06 (-9.2)	-.06 (-9.1)
Nonwhite	-.73 (-3.9)	-.56 (-2.9)
Both parents in home		.80 (4.0)
Age at first psychiatric symptom[b]		
By age 5	-1.23 (-3.5)	-1.13 (-3.2)
6-10	-1.22 (-5.2)	-1.13 (-4.8)
11-15	-.66 (-2.7)	-.59 (-2.4)
Constant	15.68 (46.8)	14.97 (39.7)
R^2	.11	.13
N	936	935

[a]Unweighted OLS regressions for males of ages 18-64 in the St. Louis ECA household sample.

[b]The excluded category is "after 15 if ever."

TABLE 4

LN WEEKLY EARNINGS
AS A FUNCTION OF PSYCHIATRIC SYMPTOMATOLOGY IN CHILDHOOD
AND AGE, RACE, AND SCHOOLING[a]

Independent Variable	Regression		
	1	2	3
Years of schooling	.04 (5.9)		.04 (5.8)
Nonwhite	-.16 (-4.1)	-.18 (-4.4)	-.16 (-3.8)
Age	.13 (8.6)	.11 (9.2)	.10 (8.4)
Age^2	-.001 (-7.8)	-.001 (-8.7)	-.001 (-7.6)
Age at first psychiatric symptom[b] By age 5		-.07 (-.9)	-.04 (-.5)
6-10		-.05 (-1.0)	-.003 (-.05)
11-15		-.09 (-1.7)	-.05 (-1.0)
Constant	3.35 (14.6)	3.79 (16.3)	3.38 (14.3)
R^2	.22	.17	.22
N	581	570	568

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[a]Unweighted OLS regressions for males of ages 18-64 in the St. Louis ECA household sample who worked full-time 50+ weeks the previous year.
[b]The excluded category is "after 15 if ever."

TABLE 5
LN WEEKLY EARNINGS
AS A FUNCTION OF PSYCHIATRIC SYMPTOMATOLOGY IN CHILDHOOD, LIFETIME DIAGNOSIS, RECENCY OF SYMPTOMS, AND OTHER VARIABLES[a]

Independent Variable	Regression		
	1	2	3
Years of schooling	.04 (5.7)	.04 (5.6)	.04 (5.6)
Nonwhite	-.12 (-2.9)	-.12 (-2.9)	-.12 (-2.9)
Age	.08 (6.7)	.08 (6.6)	.08 (6.6)
Age^2	-.001 (-6.2)	-.001 (-6.2)	-.0009 (-6.1)
Both parents in home	.04 (1.0)	.04 (1.0)	.04 (.9)
Age at first psychiatric symptom[b]			
By age 5	-.03 (-.3)	-.03 (-.4)	-.03 (-.3)
6-10	.004 (.1)	.005 (.1)	.01 (.3)
11-15	-.05 (-1.0)	-.05 (-1.0)	-.05 (-1.0)
Married with spouse present	-.001 (-.03)	.003 (.1)	.002 (.04)
Never married	-.22 (-3.6)	-.22 (-3.6)	-.22 (-3.6)
Physical health good or excellent	.08 (1.3)	.08 (1.3)	.07 (1.1)
Lifetime diagnosis of			
Anxiety disorders[c]		.05 (.6)	.07 (.9)
Affective disorders[d]		-.04 (-.4)	-.04 (-.4)
Alcohol abuse and/or dependence		-.002 (-.05)	.01 (.3)
Drug abuse and/or dependence		.02 (.3)	.03 (.5)
Antisocial personality		-.01 (-.1)	-.01 (-.1)
Organic brain syndrome		.11 (.9)	.16 (1.1)
Schizophrenic and schizophreniform disorders		-.11 (-.6)	-.11 (-.6)
Psychiatric symptoms within past year			-.05 (-1.1)
Constant	3.67 (14.7)	3.63 (14.3)	3.66 (14.3)
R^2	.25	.25	.26
N	567	567	567

[a]Unweighted OLS regressions for males of ages 18-64 in the St. Louis ECA household sample who worked full-time 50+ weeks the previous year.
[b]The excluded category is "after 15 if ever."
[c]Obsessive compulsive disorder, panic disorder, and phobia.
[d]Manic episode, major depressive episode, and dysthymia.

TABLE 6

LN PERMANENT EARNINGS[a]
AS A FUNCTION OF PSYCHIATRIC SYMPTOMATOLOGY IN CHILDHOOD
AND AGE, RACE, AND SCHOOLING[b]

Independent Variable	Regression		
	1	2	3
Years of Schooling	.04 (10.3)		.04 (9.6)
Nonwhite	-.09 (-4.1)	-.14 (-5.5)	-.10 (-4.3)
Age	.03 (4.8)	.04 (6.4)	.03 (4.9)
Age^2	-.0003 (-3.6)	-.0004 (-5.7)	-.0003 (-3.7)
Age at first psychiatric symptom[c]			
By age 5		-.10 (-2.0)	-.04 (-1.0)
6-10		-.06 (-2.0)	-.02 (-.6)
11-15		-.0004 (-0.0)	.03 (.9)
Constant	4.52 (39.0)	4.93 (41.2)	5.52 (37.3)
R^2	.21	.12	.22
N	796	775	771

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[a]Mean 1980 Census earnings for respondent's occupation. occupations were grouped into 72 categories within the 1980 Occupational Classification System.
[b]Unweighted OLS regressions for males of ages 18-64 in the St. Louis ECA household sample who worked full-time 50+ weeks the previous year.
[c]The excluded category is "after 15 if ever."

TABLE 7
LN PERMANENT EARNINGS[a]
AS A FUNCTION OF PSYCHIATRIC SYMPTOMATOLOGY IN CHILDHOOD,
LIFETIME DIAGNOSES, RECENCY OF SYMPTOMS, AND OTHER VARIABLES[b]

Independent Variable	Regression		
	1	2	3
Years of schooling	.04 (9.1)	.04 (8.3)	.04 (8.3)
Nonwhite	-.10 (-4.3)	-.10 (-4.1)	-.10 (-4.2)
Age	.03 (3.8)	.03 (3.8)	.03 (3.7)
Age^2	-.0002 (-2.8)	-.0002 (-2.8)	-.0002 (-2.8)
Both parents in home	-.03 (-1.1)	-.03 (-1.3)	-.04 (-1.4)
Age at first psychiatric symptom[c]			
By age 5	-.04 (-1.0)	-.02 (-.4)	-.02 (-.3)
6-10	-.02 (-.6)	-.006 (-.2)	-.0004 (-.01)
11-15	.02 (.7)	.02 (.6)	.02 (.7)
Married with spouse present	-.03 (-1.2)	-.03 (-1.2)	-.04 (-1.3)
Never married	-.06 (-1.7)	-.07 (-1.9)	-.07 (-1.9)
Physical health good or excellent	.04 (1.1)	.04 (1.3)	.04 (1.2)
Lifetime Diagnosis of			
Anxiety disorders[d]		-.05 (-1.2)	-.04 (-.9)
Affective disorders[e]		.13 (2.3)	.13 (2.3)
Alcohol abuse and/or dependence		-.02 (-.6)	-.01 (-.3)
Drug abuse and/or dependence		.01 (.3)	.02 (.4)
Antisocial personality		-.06 (-1.5)	-.06 (-1.4)
Organic brain syndrome		-.01 (-.2)	.004 (.1)
Schizophrenic and schizophreniform disorders		-.05 (-.5)	-.05 (-.5)
Psychiatric symptoms within past year			-.03 (-1.0)
Constant	4.63 (33.1)	4.66 (32.9)	4.67 (32.8)
R^2	.22	.23	.23
N	770	770	770

[a]Mean 1980 Census earnings for respondent's occupation. Occupations were grouped into 72 categories within the 1980 Occupational Classification System.

[b]Unweighted OLS regressions for males of ages 18-64 in the St. Louis ECA household sample.

[c]The excluded category is "after 15 if ever."

[d]Obsessive compulsive disorder, panic disorder, and phobia.

[e]Manic episode, major depressive episode, and dysthymia.

NOTES

1. Robins et al. (1984) found that the lifetime prevalence of having at least one psychiatric disorder ranged from 29% to 38% across three Epidemiologic Catchment Area sites. The annual prevalence of inpatient admission for mental health reasons ranged from .7% to 1.5% and the six-month prevalence of outpatient use of mental health specialists varied from 2.2% to 4.0% across these sites (Shapiro et al., 1984).

2. See, for example, Faris and Dunham (1939) and Hollingshead and Redlich (1958). There is a continuing exchange over the direction of causality.

3. At each site, household respondents for the study were selected by stratified sampling techniques. Each site oversampled at least one special population by design. Household and respondent selection procedures introduced further inequalities in selection probabilities. Design weights were therefore generated to compensate for differences in selection probability among respondents. Post-stratification weights were then constructed to match the age, sex, and race frequencies of the sample to those of the Census population from which it was drawn.

Because of the complex nature of the sampling design used in the ECA project - in particular weighting and clustering - standard statistical methods are not always applicable. Methods of dealing with sample weights have been a central focus of continued investigation. Project statistician Edward Spitznagel has recommended that in general unweighted data be used when examining the relationships among several variables (for example, multiple regression analysis), but that weighting be used for univariate analysis (such as calculation of means).

4. Respondents' answers to the question in Wave 2, "Which letter on this card includes how much you make at your job or jobs?" (with 21 categories designated) were truncated at $48,000. To deal with truncation, we can assume that the true earnings distribution is log normal and use a Tobit model. The nontruncated Wave 1 earnings data for St. Louis provide a basis for checking the assumption of log normality. For St. Louis respondents of ages 18-64, less than 2% of the males and no females reported Wave 1 earnings over $48,000.

5. For respondents who were not working, the value of the earnings variable was not observed. Using only the observed values is likely to introduce bias into the coefficient estimates. This problem has been addressed particularly with respect to estimates of married women's earnings (Heckman, 1979). The problem also arises when estimating the impact of a specific disorder on earnings (Mitchell and Butler, 1986). We plan to test whether selection bias affects the coefficients by re-estimating the model using the least squares correction designed by Olsen (1980).

6. It should be noted that, in a very few instances, explicit measures of economic performance are included among the symptoms of a disorder. For example, quitting a job before having another job lined up three times or more in adulthood counts toward the diagnosis of antisocial personality. We can examine the extent to which estimates are altered by removing these explicit measures of economic performance from the symptom count for the disorder.

7. To measure the earliest reported age of experiencing psychiatric symptoms, we have constructed a variable which differs somewhat from the usual ECA measures of age at onset of disorders.

The way in which information was elicited concerning age of symptom onset varied somewhat across disorders. For some disorders, the age at first symptom was elicited if the respondent endorsed even a single symptom of the disorder. The respondent was asked, "How old were you the first time you [...]?" with the interviewer enumerating the symptom or set of symptoms the respondent had endorsed in that category.

For other disorders, the age question was asked only if the respondent endorsed some minimum number or distribution of symptoms of that disorder. For such disorders, therefore, age at first symptom is a conditional measure, conditioned on the occurrence of some other symptoms either simultaneously or later. (These conditions are generally less stringent than the requirement that full criteria for positive diagnosis be met.) It would be preferable to have age of onset available for every symptom individually, but this conditional information, even with its limitations, is better than any available heretofore.

There is no ambiguity concerning the age of symptom onset for 1) respondents who endorse no symptoms of a given disorder or 2) respondents who endorse at least the threshold number of symptoms required for the onset question. Ambiguity does exist for respondents who endorse a number of symptoms which is greater than zero but less than the threshold number. We can test the robustness of estimates across differing assumptions about the ages of symptom onset for this latter group.

In addition, a few items associated with behavior at school (e.g., fighting at school, playing hooky) are included among the symptoms of antisocial personality. We will examine the extent to which excluding these items affects the age at first occurrence of any symptomatology.

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TABLE A1
MEAN EARNINGS[a] BY AGE, EDUCATION, AND OCCUPATION
FOR WEIGHTED ST. LOUIS SUBSAMPLE[b] IN 1981-82
AND 1980 U.S. CENSUS POPULATION[c] IN 1979

	Males		Females	
	St. Louis Subsample	U.S Census	St. Louis Subsample	U.S. Census
Total	$21473	$13014	$19944	$11064
Age Category				
18-24 years old	$13782	$11425	$10374	$9325
25-34 years old	19964	17543	13452	11437
35-44 years old	24496	22895	14319	11749
45-54 years old	25179	23593	13366	11637
55-64 years old	21939	22012	12115	11446
Schooling Completed				
0-8 years	$18736	$14271	$10626	$8383
9-11 years	18154	15857	11552	9212
12 years	20216	17638	12124	10370
13-15 years	23424	19802	14243	11686
16 years	22925	25884	15858	13839
17 or more years	27256	30973	18436	16966
Category of Occupation				
Managerial and professional specialty	$24129	$27372	$14940	$14404
Technical, sales, and administrative support	23780	19880	13195	10737
Service	15604	13853	9684	7990
Farming, forestry, and fishing	15511	13565	9054	7664
Precision production, craft, and repair	22198	18270	11842	11397
Operators, fabricators, and laborers	19181	15620	13163	9469

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[a]For the St. Louis subsample: current earnings at the time of the Wave 1 interviews, conducted between April 1981 and February 1982. For the U.S. Census: earnings for the calendar year 1979.

[b]St. Louis ECA household respondents of ages 18-64, reporting positive earnings at the Wave 1 interview, and employed full-time 50+ weeks the previous year.

[c]Persons of ages 18-64 reporting positive earnings and employed full-time 50+ weeks the previous year.

TABLE A2
DISTRIBUTION OF GENERAL OCCUPATIONAL CATEGORIES
IN WEIGHTED ST. LOUIS SUBSAMPLE[a]
AND 1980 U.S. CENSUS POPULATION[b]

Category of Occupation	Males St. Louis Subsample	U.S. Census	Females St. Louis Subsample	U.S. Census
Managerial and professional specialty	21.6%	23.6%	17.8%	21.5%
Technical, sales, and administrative support	16.6	19.0	44.0	45.6
Service	10.4	9.2	23.7	17.9
Farming, forestry, and fishing	2.4	4.3	.5	1.0
Precision production, craft, and repair	20.6	20.7	1.6	2.3
Operators, fabricators, and laborers	28.4	23.2	12.5	11.7

[a]St. Louis ECA household respondents of ages 18-64.
[b]Employed persons of age 16 and over.