Social Consequences of Psychiatric Disorders, I: Educational Attainment

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Objective: *This is the first in a series of investigations of the social consequences of psychiatric disorders based on the National Comorbidity Survey. Data on the relationship between preexisting psychiatric disorders and subsequent educational attainment are presented.* *Method:* *The National Comorbidity Survey is a nationally representative survey of 8,098 respondents in the age range 15–54 years. A subsample of 5,877 respondents completed a structured psychiatric interview and a detailed risk factor battery. Diagnoses of DSM-III-R anxiety disorders, mood disorders, substance use disorders, and conduct disorder were generated, and survival analyses were used to project data on school terminations to the total U.S. population.* *Results:* *Early-onset psychiatric disorders are present in more than 3.5 million people in the age range of the National Comorbidity Survey who did not complete high school and close to 4.3 million who did not complete college. The most important disorders are conduct disorder among men and anxiety disorders among women. The proportion of school dropouts with psychiatric disorders has increased dramatically in recent cohorts, and persons with psychiatric disorders currently account for 14.2% of high school dropouts and 4.7% of college dropouts.* *Conclusions:* *Early-onset psychiatric disorders probably have a variety of adverse consequences. The results presented here show that truncated educational attainment is one of them. Debate concerning whether society can afford universal insurance coverage for the treatment of mental disorders needs to take these consequences into consideration.*

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A number of studies have shown that psychiatric disorders have substantial personal costs for the individuals who experience them, as well as for their families and communities, in terms of not only finances (1–3) but also role functioning and quality of life (4–6). However, with the exception of some work on the consequences of adolescent drug use (7–9), none of these studies has elucidated the developmental processes that bring about these effects. This leaves many questions unresolved. For example, although we know that workers with psychiatric disorders have high levels of job absenteeism (10, 11), little is known about whether these disorders influence entry into the labor force or into sectors of the occupational structure in which psychiatric disorders create role impairments. Research on these influences is needed to provide an understanding of the critical periods during which psychiatric disorders have their most powerful social effects and the ways in which these effects influence subsequent life experiences.

In the present paper we present an analysis of the effects of preexisting psychiatric disorders on educational attainment as the first in a series of investigations of the impact of psychiatric disorders on life course experiences based on data from the National Comorbidity Survey (12). Despite the fact that virtually all young people in the United States have access to education through high school and the fact that access to college education has increased dramatically since World War II because of new government loan programs and the community college system, many young people still do not graduate from high school (about 12% of primary

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school graduates), many graduates do not enter college (about 50%), and many entrants fail to complete all 4 years of college (about 50%) (13). These failures are important for at least two reasons. First, from a societal perspective, the ability of a nation to increase its standard of living and to provide the basis for widespread participation in civic affairs requires an educated citizenry. Second, from an individual perspective, success in the educational system is a critical determinant of many later-life opportunities and experiences, including occupational achievement (14), financial security (15), and lifestyle behaviors that influence health and well-being (16).

METHOD

Sample

As described in more detail elsewhere (12), the National Comorbidity Survey is based on a stratified, multistage area probability sample of persons ages 15 to 54 in the noninstitutionalized civilian population plus students in group housing in the 48 coterminous United States. The field work was carried out between Sept. 14, 1990, and Feb. 6, 1992. The response rate was 82.4% (N=8,098). Informed consent was obtained from all respondents after the content and length of the interview were explained. In the case of minors (ages 15–17), parental consent was obtained before the minor was approached. Consent from both the parent and minor was required to include a minor in the study. The interviews were in two parts. Part I included the core diagnostic interview and was administered to all respondents. Part II included a detailed risk factor battery and a series of diagnoses of secondary interest to the investigation; it was administered to a subsample of 5,877 respondents consisting of all those who screened positive for any lifetime diagnosis in part I, all others in the age range 15–24, and a random subsample of other respondents. The analyses reported here are based on the part II subsample, weighted to be representative of the population (12).

Diagnostic Assessment

The 14 psychiatric diagnoses assessed in the survey and included in the present report consist of DSM-III-R anxiety disorders (panic disorder, generalized anxiety disorder, simple phobia, social phobia, agoraphobia, posttraumatic stress disorder), mood disorders (major depression, dysthymia, bipolar disorder), substance use disorders (alcohol abuse without dependence, alcohol dependence, other drug abuse without dependence, other drug dependence), and conduct disorder. Diagnoses were generated from a modified version of the Composite International Diagnostic Interview (17), a structured interview designed to be used by trained interviewers who are not clinicians. World Health Organization field trials of the interview have documented good reliability and validity of all the diagnoses considered here (18). The National Comorbidity Survey also assessed schizophrenia and other affective psychoses, but the number of respondents who met the diagnostic criteria was so small and these disorders were so comorbid with other disorders that we were unable to estimate stable coefficients for the effects of these disorders.

Analysis Procedures

Data on the age at onset of each assessed disorder were combined with information on educational attainment to create a discrete-time survival file in which disorders were treated as time-varying predictors of school termination (19). Each year of education was treated as a separate observational record with a dichotomous outcome variable, i.e., whether the respondent terminated (coded 1) or completed (coded 0) schooling in that year. Respondents who completed fewer than 16 years of education were assigned one more observational record than their years of completed education and given an outcome score of 1 for that final year. Respondents who completed college were assigned 16 observational records and assigned a score of 0 in all years.

This data array—consisting of 79,274 observations (equivalent to an average of 12.6 years of education for each of the 5,877 respondents)—was analyzed as a series of logistic regression equations with person-year as the unit of analysis. In addition to the measures of psychiatric disorder, which were each coded 1 as of the year of first onset and 0 in earlier years, the prediction equations included controls for cohort (age at the time of interview), grade in school, and sociodemographic variables that have been shown to be both determinants of schooling (20–22) and correlates of psychiatric disorders (12, 23). The latter included measures of family of origin socioeconomic status (parents' education, subjectively perceived financial adversity in the respondent's family of origin), being raised in a female-headed household, number of siblings, nativity (born in the United States, number of parents born in the United States), urbanicity, and region of residence (Northeast, South, Midwest, West). The coefficients in these models are equivalent to discrete-time survival coefficients (24, 25).

In addition to survival analysis, we used simulations to evaluate the policy significance of the estimated effects of the disorders. This was done by creating a data file in which each respondent was given as many person-years (up to a maximum of 16) as the number of years he or she had the potential to be in school given his or her age (a total of 91,631 person-years). A predicted probability of terminating school in each year was assigned to each unit in this file on the basis of a summary survival equation that included all the individual disorders, comorbidity among the disorders, and controls. Five simulated predicted probabilities were then assigned to each person-year in this file on the basis of versions of the equation that assumed that either one class of disorders (anxiety disorders, mood disorders, substance use disorders, or conduct disorder) or all these disorders and their comorbidities together were eradicated. The person-years were then aggregated to a person-level file, and the conditional probabilities of school termination were cumulated to arrive at a series of six estimates of each respondent's predicted probability of dropping out of school by various grades. The differences between the cumulation of the predicted probabilities based on the full equation and the cumulations based on the five reduced equations were then projected to the total U.S. population in the age range of the sample to estimate the number of school terminations directly due to the disorders considered in this analysis. Parallel simulations were also carried out to study the effects of psychiatric disorders on number of lost years of education.

Despite the finding of gender differences in the effects of the sociodemographic control variables consistent with those in earlier studies (24), there were no more significant gender differences in the survival coefficients for the psychiatric disorders than one would expect by chance. As a result, all final models constrained the effects of the disorders to be the same for men and women.

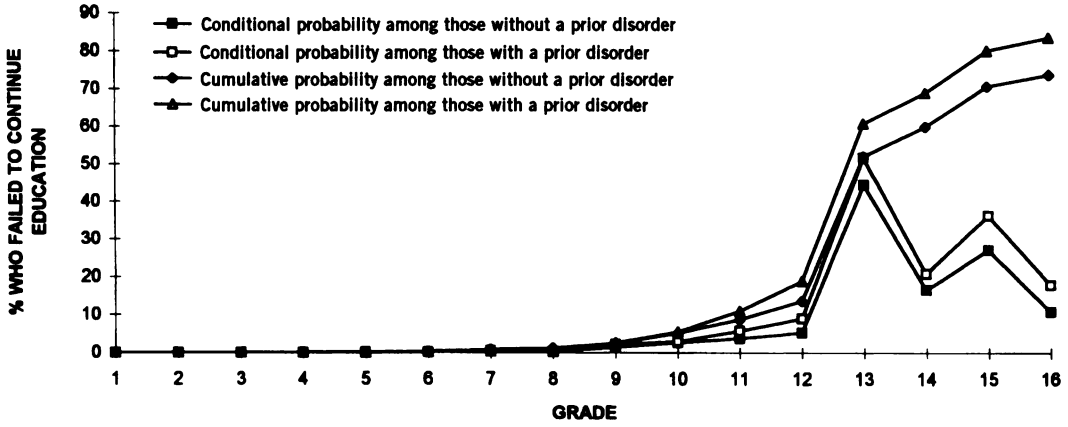
Equations were estimated separately for school termination during the primary school years, termination during the high school years, failure to enter college among high school graduates, and failure to complete college among college entrants. There is evidence that the determinants of school termination differ across these transitions (23). The number of dropouts during the primary school years was so small (only 1.8% of males and 0.5% of females) that none of the predictors was significant at the 0.05 level. Because of this fact, the results to be reported focus on terminations at later stages.

As individual-specific information on age at school entry or interruption of schooling was not obtained, a global rule was used to link the information on disorder age at onset with the education grade-completion data: psychiatric disorders with onsets before the age of 12 were used to predict school termination in the ninth grade and later, while information about disorders with onsets before 1, 2, etc. years later was used to predict school termination in the 10th, 11th, etc. years of education and later. This rule was designed to be conservative, as the upper end of the age range over which the onset of disorders was evaluated was probably earlier than the age at entry into the educational level under consideration.

TABLE 1. Distribution of Educational Attainment by Age Cohort Among Respondents in the National Comorbidity Survey (N=5,877)

	Age at Interview (years)									
	15–24		25–34		35–44		45–54		Total	
Educational Attainment	%	SE	%	SE	%	SE	%	SE	%	SE
Men										
Completed primary school	99.5	0.3	97.1	0.9	98.3	0.7	97.4	1.2	98.2	0.4
Completed high school (for primary school graduates)	89.5	1.6	84.4	1.9	89.1	1.7	76.4	3.4	85.9	0.9
Entered college (for high school graduates)	49.2	3.4	49.9	2.7	38.5	2.8	41.0	4.3	44.5	1.6
Completed college (for college entrants)	62.3	4.7	56.9	3.6	54.5	3.6	48.0	5.6	55.2	2.1
Women										
Completed primary school	99.8	0.2	100.0	0.1	99.7	0.3	97.8	1.0	99.5	0.2
Completed high school (for primary school graduates)	89.4	1.6	85.0	1.8	90.3	1.7	83.9	2.5	87.3	0.9
Entered college (for high school graduates)	50.5	3.3	47.6	2.6	46.5	2.9	53.2	3.7	48.7	1.5
Completed college (for college entrants)	50.6	4.6	40.0	3.3	52.6	3.8	52.3	5.1	47.6	2.0

FIGURE 1. Relation of Prior Psychiatric Disorders to Probability of Failure to Continue Education, at Each Grade, for Respondents in the National Comorbidity Survey (N=5,877)



Because of the complex sample design and weighting of the National Comorbidity Survey, standard errors of the survival coefficients were estimated by the method of balanced repeated replication (26) by using a macro in SAS-UNIX (27). The standard errors of the simulations were estimated by the method of jackknife repeated replication (26) by using a separate SAS macro. Exponentiated survival coefficients are reported as odds ratios with 95% confidence intervals that have been adjusted for design effects. Odds ratios greater than 1.0 are associated with greater chances of educational termination, while odds ratios less than 1.0 are associated with lower chances of educational termination. An odds ratio of 2.0 can be interpreted as showing that the odds of educational termination among people with a particular prior disorder is two times the odds of termination among others, with sociodemographic variables controlled for. Unless otherwise noted, "significant" is used only to describe situations in which test statistics were found to be significant at the 0.05 level according to two-tailed tests.

RESULTS

Distribution of Educational Attainment

The results in table 1 show the distribution of educational attainment separately for men and women in the total sample and 10-year birth cohorts. Almost all of the men and women completed primary school, and the vast majority of those who did complete primary school also completed high school. Somewhat fewer than one-half of the high school graduates went on to college, and approximately one-half of these graduated from a 4-year college. No distinction is made in table 1 between respondents who graduated from 1-year or 2-year junior college programs and those who completed fewer than 4 years at a college or university. There were modest gender differences; women were somewhat more likely than men to complete primary school, and male high school graduates were somewhat more likely than women to graduate from college (table 1). There are also modest cohort differences; educational attainment was slightly lower in the only pre-World War II cohort (45–54 years of age, born between 1936 and 1947) than in the postwar cohorts. These patterns are all consistent with U.S. census population data for these cohorts (13).

Effects of Psychiatric Disorders on Educational Attainment

Figure 1 presents gross (without any controls) patterns of educational attainment among respondents who had no history of any assessed disorder before terminating their education and those who had one or more such disorders. The probabilities of termination

TABLE 2. Effects of Prior Psychiatric Disorders on Failure to Make Educational Transitions for Respondents in the National Comorbidity Survey (N=5,877)

Psychiatric Disorder	Failure to Complete High School Among Eighth Grade Graduates		Failure to Enter College Among High School Graduates		Failure to Complete College Among College Entrants	
	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval
Type of disorder						
Anxiety	1.4[a]	1.1–1.8	1.4[a]	1.2–1.8	1.4[a]	1.2–1.6
Mood	1.5[a]	1.1–1.9	1.6	0.7–3.6	2.9[a]	1.4–5.8
Substance use	2.3[a]	1.8–3.1	2.0[a]	1.1–3.8	1.4	0.7–2.8
Conduct	2.4[a]	1.8–3.2	1.5[a]	1.1–1.9	1.3	1.0–1.7
Number of disorders overall						
Continuous[b]	1.5[a]	1.3–1.6	1.4[a]	1.2–1.6	1.3[a]	1.2–1.5
Discrete[c]						
None	1.0		1.0		1.0	
One	1.5[a]	1.2–1.9	1.4[a]	1.1–1.8	1.3[a]	1.0–1.7
Two	2.8[a]	1.8–4.3	1.8[a]	1.2–2.7	1.8[a]	1.3–2.4
Three or more	3.9[a]	2.3–6.5	3.5[a]	1.6–7.3	2.3[a]	1.4–3.7

[a]Significant coefficient ($p<0.05$, two-tailed test).
[b]A single variable for the number of disorders was used as a predictor of the educational transitions. The odds ratios are associated with the average effect of an increase of one disorder across the range of this continuous variable.
[c]A series of separate dummy (dichotomous coded 0, 1) predictor variables for having exactly one disorder, exactly two disorders, or three or more disorders (with having zero disorders used as the omitted contract category) were used simultaneously to predict the educational transitions. The odds ratios are contrasts between each discrete subsample and the omitted category (zero lifetime disorders).

are consistently higher, beginning in the high school years, among respondents with a prior disorder. The cumulative impact of these conditional probabilities is an approximately 10% lower probability of college graduation among people with a prior disorder than among those with no disorder by age 54.

The results in table 2 show summary estimates from separate discrete-time survival equations of the effects of the four main types of assessed disorders on three nested stages of schooling. The numbers of disorders referred to at the bottom of the first column in table 2 are counts of the number of anxiety, mood, and substance use disorders with odds ratios of 1.4 or greater in a previous bivariate analysis. (Results of this analysis and other results not reported in the paper are available either from Dr. Kessler or from the Internet appendixes described in the footnote on the first page of the article.)

As shown in table 2, all three types of educational failure are positively and, for the most part, significantly associated with having a prior disorder. All four types of disorders are significant predictors of failure in all three educational transitions, with odds ratios ranging between 1.3 and 2.9. The odds ratios associated with conduct disorder and substance use disorders are significantly higher than those associated with anxiety and mood disorders in predicting high school termination. There is also a clear "dose-response" relationship between number of prior disorders and dropping out of high school. The effect of mood disorders in predicting failure to enter college is slightly larger, and the effects of conduct and substance use disorders are somewhat smaller (significantly so for conduct disorder; $z=-2.4$, $p<0.05$) and no longer significantly larger than the effects of anxiety or mood disorders (with z values ranging between 0.2 and 1.0). The odds ratios associated with conduct and substance disorders are even smaller for prediction of failure to graduate from college (with the decreasing trend of odds ratios significant for conduct disorder, $z=-2.6$, $p<0.05$), while the odds ratio associated with mood disorders is significantly larger than in the earlier equations ($z=3.3$, $p<0.05$).

Population proportions of school failures due to the assessed disorders were estimated separately for males and females because there are statistically significant gender differences in the prevalences of the disorders (12). As shown in table 3, 14.2% of high school dropouts, 5.0% of high school graduates who do not enter college, and 4.7% of college entrants who do not complete college have histories of psychiatric disorders. Conduct disorders are the most important among males for all three transitions, while among females conduct and anxiety disorders are the most important for high school termination and anxiety disorders are the most important for subsequent transitions. Results concerning the percentage of years of lost education due to psychiatric disorders (not shown) are almost identical to those in table 3, indicating that the timing of school termination associated with earlier psychiatric disorders is similar to the timing of termination due to other reasons.

More detailed analyses (not shown) documented that while the structural effects reported in table 2 do not differ significantly by cohort, the proportions reported in table 3 have increased in more recent cohorts because of the combination of a secular decrease in early termination of education and an increase in the prevalences of early-onset disorders. This is most dramatically true for high school dropouts. In the most recent National Comorbidity Survey cohort (born between 1966 and 1975), 23.6% of the male high school dropouts and 22.7% of the female high school dropouts had earlier psychiatric disorders, com-

TABLE 3. Prevalence of Prior Psychiatric Disorders Among Respondents in the National Comorbidity Survey (N=5,877) Who Failed to Make Educational Transitions

Type of Prior Disorder	Percent of Population With Disorder Type								
	Failure to Complete High School Among Eighth Grade Graduates			Failure to Enter College Among High School Graduates			Failure to Complete College Among College Entrants		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
Anxiety	2.9	5.4	4.1	2.1	3.7	3.0	1.9	3.0	2.6
Mood	1.7	2.2	1.9	0.2	0.2	0.2	0.4	0.3	0.3
Substance use	4.9	2.4	3.7	0.7	0.3	0.5	0.7	0.3	0.4
Conduct	16.2	6.8	11.7	3.6	1.1	2.2	3.6	0.9	2.1
Any	15.4	13.0	14.2	5.5	4.6	5.0	5.4	4.1	4.7

TABLE 4. National Projections of High School and College Terminations Due to Prior Psychiatric Disorders, Based on Data From the National Comorbidity Survey (N=5,877)

Type of Termination and Age Range (years)	Projected Population With Psychiatric Disorders (in millions)[a]					
	Males		Females		Total	
	Estimate	95% Confidence Interval	Estimate	95% Confidence Interval	Estimate	95% Confidence Interval
Noncompletion of high school						
15–24	0.66	0.41–0.91	0.66	0.41–0.91	1.32	0.83–1.81
25–34	0.64	0.28–1.00	0.58	0.29–0.87	1.22	0.61–1.84
35–44	0.28	0.12–0.44	0.18	0.06–0.29	0.46	0.19–0.73
45–54	0.35	0.14–0.57	0.17	0.08–0.26	0.50	0.24–0.76
Total	2.03	1.08–2.98	1.53	0.87–2.18	3.53	1.96–5.09
Noncompletion of college						
15–24	1.01	0.73–1.30	0.84	0.60–1.09	1.89	1.41–2.38
25–34	0.78	0.50–1.07	0.59	0.36–0.82	1.36	0.89–1.82
35–44	0.48	0.30–0.69	0.36	0.22–0.50	0.86	0.56–1.16
45–54	0.22	0.11–0.32	0.21	0.11–0.31	0.43	0.25–0.60
Total	2.46	1.67–3.24	1.85	1.23–2.47	4.29	3.01–5.56

[a]Based on the 1990 U.S. population of 176.9 million in the age range 15–54 years.

pared to only 9.6% of the men and 6.8% of the women in the earliest National Comorbidity Survey cohort (born in 1936–1945). More detailed analyses (not shown) show that substance use disorders, which had a dramatic increase in prevalence over this time period (28), are responsible for the bulk of this trend.

The results shown in table 4 suggest that 3.53 million more people in the age range of the National Comorbidity Survey (out of 176.9 million in the 1990 U.S. population) would have completed high school and 4.29 million more would have graduated from college if it were not for these disorders. The simulations suggest that 7.26 million people were involved in these 7.82 million transition failures, the overlap of 0.56 million representing high school dropouts who would have been expected not only to complete high school but also to graduate from college if it had not been for their psychiatric disorders.

DISCUSSION

Limitations

It is important to recognize four limitations of the preceding analyses, all of which impart a conservative bias to the results reported here. First, the National Comorbidity Survey sample probably contains a lower proportion of respondents with a history of early-onset psychiatric disorders than the population because of both the incompleteness of the sampling frame (e.g., exclusion of the homeless) and the likelihood that nonrespondents have higher rates of disorders than respondents (29, 30). We attempted to correct the latter part of this problem by carrying out a nonresponse study (12). However, this adjustment might be incomplete because hard-core refusers (who could not be persuaded to participate even in the nonresponse studies) might have had higher rates of disorder than were assumed in the adjustments.

Second, the results hinge on respondent recall of ages at onset of particular disorders. We attempted to be conservative in this regard by asking the respondents to judge their certainty in recalling ages at onset and, in cases of uncertainty, using the earliest age at which the respondent could remember a particular episode of the disorder (an upper bound on age at onset) as the age at onset in our analysis.

Third, we have already noted that the National Comorbidity Survey did not collect individual-specific information on age at school entry, grades the respondent had to repeat, or interruptions in schooling. As a result, we assumed that all respondents entered ninth grade at

the age of 13 and that the only disorders that could affect successful completion of the ninth grade were those that occurred by the age of 12. This was designed to be conservative in the sense of erring in the direction of excluding some disorders that could have occurred as a result of school failure.

Related to this third point, it is important to recognize that some of the National Comorbidity Survey respondents who dropped out of high school, never went to college, or dropped out of college might return to school in the future. We suspect this number is small, though, on the basis of data from the U.S. National Center for Education Statistics showing that the chances of school completion are quite small among those who have been out of school for longer than 5 years (31). Most National Comorbidity Survey high school dropouts (87.2%) and people who had started but never completed college (86.4%) had been out of school more than 5 years as of the time of the interview (with medians of 20 years out of school for high school dropouts and 15 for college dropouts). This suggests that the effects of psychiatric disorders on current education documented here represent lifelong effects for the vast majority of the respondents.

Fourth, the present analysis probably underestimates the impact of psychiatric disorders on educational attainment because it focuses only on failures at major points of educational transition. It is likely that these disorders also influence grade point averages among graduates, an outcome known to have important implications for accomplishments in later life (14).

Implications

Despite the fact that the results are conservative, we estimate that more than 7.2 million people in the United States prematurely terminated their education because of early-onset psychiatric disorders, and only a small fraction will later complete either high school or college. Research shows that there are many adverse life-course consequences of truncated educational attainment (14–16, 32, 33). There are also societal consequences, such as less training of the workforce, less capability of full functioning in civic life, and greater demands on social welfare entitlements.

These results have important implications for policy debate on national health care insurance, a debate fundamentally concerned with evaluating how much society can afford to guarantee its citizens in terms of health care. In making this evaluation, it is critical to have information on the costs of both treating and not treating particular classes of disorders and to weigh the competing costs of alternative policy decisions. The results presented here show that early-onset psychiatric disorders have adverse personal consequences, through greater educational failure and its sequelae, for the individuals who experience them and have adverse consequences for the broader society in which these individuals live. A cost accounting of these and other consequences, to be explored in future analyses of these data, may well lead to the conclusion that we cannot afford to forgo the opportunity to develop early interventions and treatments to prevent these costly consequences for society and some of its most vulnerable citizens.

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