Consequences of Receipt of a Psychiatric Diagnosis for Completion of College

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Objective: The purpose of this study was to evaluate the independent associations between _DSM-IV_ psychiatric disorders and the failure to complete college among college entrants. _Methods:_ Data were from the 2001–2002 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). The sample included 15,800 adults, aged 22 years and older, who at least entered college. Diagnoses were made with the NESARC survey instrument, the Alcohol Use Disorder and Associated Disability Interview Schedule—DSM-IV Version. The large sample permitted analysis of multiple psychiatric disorders in the same multivariable logistic regression models. Given the frequent comorbidity of these disorders, this approach is an important step toward disentangling the independent roles of disorders in postsecondary educational outcomes. _Results:_ Evaluation of the independent associations between specific psychiatric disorders and postsecondary educational attainment showed that five diagnoses were positively and significantly associated with the failure to graduate from college. Four were axis I diagnoses: bipolar I disorder, marijuana use disorder, amphetamine use disorder, and cocaine use disorder. One was an axis II diagnosis: antisocial personality disorder. _Conclusions:_ This study provides new data on _DSM-IV_ diagnoses associated with the failure to complete postsecondary education. The findings suggest that psychiatric factors play a significant role in college academic performance, and the benefits of prevention, detection, and treatment of psychiatric illness may therefore include higher college graduation rates. (_Psychiatric Services_ 61:399–404, 2010)

Mental disorders among college students appear to be increasing and may lead to substantial economic and functional impairment over time. About 90% of campus directors of counseling centers report an increase in psychological problems among their students (1), and the proportion of students with a previous diagnosis of depression increased from 10% to 15% between 2000 and 2005 (2). The first onset of most mental disorders occurs before or during the typical college ages of 18 to 24 (3), and the many social, economic, and academic pressures of college may further exacerbate these mental problems (4). Despite increased awareness about the prevalence of psychiatric disorders among college students, little is known about the impact of these disorders on the central educational mission of colleges: to provide knowledge and skills. The link between mental health and academic success in college is important to understand not only from the perspective of the institutions' objectives but also from a broader societal perspective. Over two-thirds of high school graduates attend postsecondary education (5), but only about half of college enrollees complete their degree (6). College completion has a beneficial effect on economic well-being through increased future earnings (7,8) and on physical health through lower mortality rates and better self-reported health (9,10). Mental illness may play an important role in this poor overall graduation rate and the resulting loss of societal human capital.

Much of the evidence regarding the connection between mental health and academic outcomes for college students is based on small clinical samples. These studies primarily focused on depression (11–13) and indicate that measures of poor mental health are associated with worse academic outcomes. Two other studies examined nationally representative data from the National Comorbidity Survey (NCS) and the NCS-Replication (NCS-R), respectively. Using the NCS, Kessler and colleagues (14) found that failure to graduate from college was positively associated with several categories of mental disorders, but they did not ex-

amine specific *DSM* disorders. Breslau and colleagues (15) examined the impact of specific disorders on educational attainment but were unable to determine whether co-occurring disorders, such as substance use disorders, explained the impact of mood and anxiety disorders on outcomes. Improving our understanding of how co-occurring conditions affect educational attainment among students may help in prioritizing strategies in college mental health to improve care for the student population.

In this study we evaluated the association between psychiatric disorders, such as bipolar I disorder, and the failure to complete college among college entrants. We analyzed data from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), which were collected by the National Institute on Alcohol Abuse and Alcoholism in 2001–2002. The sample we derived from the NESARC data included 15,800 adults, aged 22 years and older, who had at least entered college.

To our knowledge, this analysis used the largest available sample to analyze the relationship between psychiatric diagnoses and attainment of college education among college entrants. This large sample permitted the first analysis of a sample with multiple psychiatric disorders in the same regression models. Given the frequent comorbidity of the disorders included in this study, this approach is an important step toward disentangling the independent roles of disorders in educational outcomes.

Methods
Sample and data source
The NESARC is a population-based survey providing data on the U.S. population regarding alcohol use as well as psychiatric and medical comorbidities. A total of 43,093 Americans participated in the first wave of the survey. The target population of the NESARC is the noninstitutionalized population that is aged 18 and older. Further information regarding the NESARC and its methodology can be found in the literature (16,17).

To focus the analysis on the outcome of whether someone completed or dropped out of college, we limited the sample to people who at least entered college. We also limited the analysis to adults aged 22 years and older, given that few individuals obtain a college degree before age 22 (5). We excluded college students who were actively pursuing their degrees at the time of their interview because we could not code them as "successes" or "failures." Finally, we dropped adults who completed a two-year degree because we were focused primarily on the failure to graduate with a bachelor's degree, and we were unable to identify whether dropouts were attending a two-year or four-year institution. After applying these criteria, 15,800 persons remained in our primary analysis.

Variables
The primary outcome variable was coded as a binary variable, with 0 representing graduation from college with a bachelor's degree and 1 representing no graduation from college (in other words, some college but no bachelor's degree). The primary predictor variables were binary lifetime diagnoses, which were coded 0 for no diagnosis before age 22 and 1 for having that specific diagnosis before age 22. These diagnoses were made by using the NESARC survey instrument, the Alcohol Use Disorder and Associated Disability Interview Schedule—DSM-IV Version (AUDADIS-IV). The reliability and validity of this instrument are supported by multiple studies (16,17). Six lifetime psychiatric diagnoses were included in our model: mania (bipolar I), major depression, panic disorder with agoraphobia, social anxiety disorder, generalized anxiety disorder, and antisocial personality disorder. Four substance use disorders were included in our model, to cover alcohol, marijuana, stimulant (amphetamine), and cocaine abuse or dependence. These diagnoses were selected because they represent some of the most common diagnoses among adolescents and young adults, and their symptoms have plausible effects on academic success (18). They include the most severe diagnosis in each diagnostic category. For example, mania (bipolar I) was selected instead of hypomania (bipolar II), major depression was

chosen over dysthymia, and panic disorder with agoraphobia was selected instead of agoraphobia or panic disorder alone.

Sociodemographic covariates included age at time of interview, gender, race and ethnicity, family income, being raised in a female-headed household or not, country of birth (United States or not), urbanicity (rural, suburban, or urban), and region of residence (east, south, midwest, or west). Race and ethnicity included the following categories: white, non-Hispanic black, American Indian or Alaska Native, Asian, and Hispanic or Latino. These variables were selected on the basis of a large education literature that demonstrates their importance in postsecondary educational attainment (5,19–24).

Analyses
We completed our analyses in four stages. First, we conducted bivariate analyses to examine the relationship between the outcome variable of failure to graduate from college and the predictor variables, which were the diagnoses. Second, we performed separate regressions to examine the association between each diagnosis and educational attainment, controlling only for sociodemographic variables. Third, we looked at all of the clinical diagnoses in the same multivariable logistic regression model without controlling for sociodemographic variables. Fourth, we created our final model, which included all of the diagnoses as well as the sociodemographic variables. The final model discriminated reasonably well with a c statistic of .697. The p value for the likelihood ratio from the chi square test of the model was less than .001. Analyses were conducted with Stata version 10, and the study was classified as exempt by the University of Michigan Institutional Review Board.

Results
Of the 15,800 adults in our sample, 56% were women, 16% were non-Hispanic black, and 14% were of Hispanic or Latino ethnicity. Fifty-seven percent of the sample completed college, and 43% did not. Five percent of the sample met criteria for a diagnosis of major depression before age

22, and 26% of the sample met criteria for alcohol use disorder before age 22, indicating a high prevalence of heavy drinking in this population. The sociodemographic and clinical characteristics of the population are presented in Table 1.

Among the sociodemographic variables, being raised in a female-headed household was a strong predictor of failure to graduate from college (odds ratio [OR]=1.67, 95% confidence interval [CI]=1.48–1.88). Compared with the white reference group, non-Hispanic blacks (OR=1.48, CI=1.34–1.63), American Indians and Alaska Natives (OR=1.39, CI=1.04–1.86), and Hispanic and Latino adults (OR=1.80, CI=1.61–2.01) were significantly more likely to leave college without a degree. Adults in the midwest (OR= 1.25, CI=1.12–1.39), south (OR=1.22, CI=1.11–1.35), and west (OR=1.37, CI=1.24–1.53) were more likely than college entrants in the northeast to leave college.

In our final multivariable logistic regression model, which controlled for individuals' sociodemographic characteristics and diagnoses, we found five diagnoses to be significantly and positively associated with failure to graduate from college: bipolar I disorder, antisocial personality disorder, and marijuana, amphetamine, and cocaine use disorder (Table 2). In the fourth model, cocaine abuse or dependence (OR=1.69) and bipolar I disorder (OR=1.70) had the strongest relationships with the dropping out of college. Major depression, social anxiety, and generalized anxiety all had significant unadjusted associations with failure to graduate from college (model 1) but insignificant associations when the sociodemographic variables were included (model 2). Antisocial personality disorder had a positive and significant relationship with failure to complete college in the final model (OR=1.31). Alcohol use disorder surprisingly had a very slight negative and insignificant association with completion of college (OR=.99). Marijuana, amphetamine, and cocaine use disorders were all positively related to dropout (OR=1.26, 1.50, and 1.69, respectively).

Table 1

Sociodemographic and clinical characteristics of 15,800 adults who reported at least some college education, 2001–2002[a]

Covariate	N	%
Age (mean±SD)	46±15	—
Family income (mean±SD $)	63,922±73,000	—
Female	8,873	56.2
Race or ethnicity		
White	10,172	64.3
Non-Hispanic black	2,582	16.3
American Indian or Alaska Native	221	1.4
Asian	678	4.3
Hispanic or Latino	2,147	13.6
Raised in female-headed household[b]	1,353	8.8
Born outside the United States	2,300	14.6
Urbanicity (metropolitan statistical area)		
City	5,369	34.0
Not a city	8,253	52.2
Not in a metropolitan statistical area	2,178	13.8
Region of residence		
Northeast	3,131	19.8
Midwest	3,253	20.6
South	5,578	35.3
West	3,838	24.3
Education (outcome variable)		
Some college, no degree	6,767	42.8
Completed college (bachelor's degree)	9,033	57.2
Diagnosis (before age 22)		
Major depression	828	5.2
Mania (bipolar I)	166	1.1
Panic disorder with agoraphobia	42	.3
Social anxiety disorder	544	3.4
Generalized anxiety disorder	144	.9
Antisocial personality disorder	359	2.3
Alcohol use disorder	4,097	26.0
Marijuana use disorder	1,153	7.3
Amphetamine use disorder	248	1.6
Cocaine use disorder	321	2.0

[a] From the National Epidemiologic Survey on Alcohol and Related Conditions
[b] N=15,412

Discussion

Main findings

We used a large, nationally representative sample to evaluate the independent associations between specific psychiatric disorders and postsecondary educational attainment. We found five diagnoses to be positively and significantly associated with the failure to graduate from college among college entrants: bipolar I disorder; marijuana, amphetamine, and cocaine use disorder; and antisocial personality disorder.

Of particular interest is the finding that bipolar I disorder had a strong positive relationship with failure to graduate from college. Given the disabling nature of this disorder (25–27), it makes sense that it would have a strong relationship with educational failure, but why did it have a stronger relationship than other disabling conditions such as major depression, panic disorder with agoraphobia, or generalized anxiety disorder? All of these disorders consist of harmful symptoms that have the potential to affect academic functioning (28,29). Perhaps, underdetection of bipolar I disorder among adolescents (30–33) led to poor subsequent educational outcomes in college. Bipolar I disorder might be further exacerbated by the stressful lifestyle and workload of college, which often consists of poor sleeping habits, binge drinking, and relationship issues (4) that might trigger affective episodes. Considering the strong association between bipolar I disorder and educational attainment, further longitudinal investiga-

Table 2

Logistic regressions of association between *DSM-IV* diagnosis and failure to graduate from college

Diagnosis	Model 1[a]			Model 2[a,b]			Model 3[c]			Model 4[b,c,d]		
	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p
Major depression	1.20	1.04–1.38	.011	1.09	.93–1.26	.287	1.02	.88–1.18	.814	.93	.80–1.10	.405
Mania (bipolar I)	2.37	1.73–3.27	<.001	1.97	1.40–2.78	<.001	1.93	1.38–2.69	<.001	1.70	1.18–2.43	.004
Panic disorder with agoraphobia	1.34	.73–2.45	.349	1.31	.69–2.50	.406	1.02	.54–1.91	.955	1.07	.54–2.09	.85
Social anxiety disorder	1.28	1.08–1.52	.005	1.18	.99–1.42	.066	1.17	.98–1.40	.091	1.10	.91–1.33	.323
Generalized anxiety disorder	1.46	1.05–2.02	.025	1.30	.91–1.86	.146	1.13	.79–1.60	.506	1.08	.74–1.57	.688
Antisocial personality disorder	1.66	1.35–2.05	<.001	1.59	1.27–2.00	<.001	1.37	1.10–1.71	.005	1.31	1.03–1.66	.027
Alcohol use disorder	.96	.89–1.03	.216	1.09	1.00–1.18	.042	.86	.79–.92	<.001	.99	.91–1.08	.836
Marijuana use disorder	1.42	1.26–1.60	<.001	1.52	1.34–1.74	<.001	1.20	1.04–1.37	.011	1.26	1.08–1.46	.003
Amphetamine use disorder	2.29	1.77–2.97	<.001	2.27	1.71–3.01	<.001	1.54	1.15–2.05	.004	1.50	1.10–2.05	.01
Cocaine use disorder	2.34	1.86–2.94	<.001	2.30	1.79–2.94	<.001	1.83	1.41–2.36	<.001	1.69	1.29–2.23	<.001

[a] Each diagnosis was entered into a separate logistic regression.

[b] Covariates entered into the regressions include age at time of interview, gender, race and ethnicity (reference group: white), family income, being raised in a female-headed household or not, country of birth (United States or not), urbanicity (reference group: central city metropolitan statistical area), and region of residence (reference group: northeast).

[c] All ten diagnoses were entered together into one logistic regression.

[d] N=15,412 in this final multivariable logistic regression model (c statistic=.697)

tion of possible mechanisms would be valuable.

The other axis I disorders that demonstrated a significant, positive relationship with failure to graduate from college were all substance use disorders, including abuse of or dependence on marijuana, amphetamine, and cocaine. This finding is consistent with previous research analyzing the links between drug abuse and disability (34,35). One perhaps surprising finding was the slight negative and insignificant relationship of alcohol use disorder with the failure to graduate. Given the known detrimental effects of alcohol use disorders (36–38), this finding is difficult to explain, but similar findings have been reported in the past, especially in the white population (39,40). In the college population, it may be difficult to sort out recreational drinking from true problem drinking with *DSM-IV* diagnostic criteria alone.

Antisocial personality disorder had a positive relationship with failure to graduate. Given that this disorder's criteria include irreverent behavior, criminal activity, and general disregard for societal rules (28,29), the college students with this diagnosis likely had legal difficulty that would be a definite barrier to completion of a degree (28).

It is important to understand why several disorders, including major depression, panic disorder with agoraphobia, social anxiety, and generalized anxiety, had weak, insignificant associations in our model with failure to graduate. This finding could be due to a variety of factors that are not mutually exclusive. First, these conditions may not be as detrimental to academic productivity as commonly assumed. Second, students with these conditions may have benefited from more effective treatment and support than students with the conditions that are significantly associated with failure to graduate. Third, the estimated effects of these conditions may be confounded by unmeasured factors that differ among individuals with the conditions compared with individuals without those conditions. For example, to a certain extent young people with generalized anxiety disorder may be more likely to strive for perfection in their studies (41), which could enhance their educational performance. Fourth, respondents who were able to attend college despite having a previous diagnosis demonstrated resiliency—a trait that might be an important unmeasured factor in college graduation.

Studies analyzing the link between mental health and education outcomes have primarily focused on primary and secondary education. Most noteworthy evidence for the college student population derives from small, clinical samples of counseling service clients at a single institution. These studies found that depression was negatively associated with academic success (11,13,42). These studies also suggest an important connection between mental health and college outcomes, but it is difficult to know how the results generalize to the broader populations of college students, including the large proportion of students with mental disorders who do not seek treatment (43).

Kessler and colleagues (14) used data from the NCS to look at the association between categories of mental disorders and college graduation in the general population of college entrants. More recently, Breslau and colleagues (15) used NCS-R data to analyze associations between specific mental disorders (with childhood onset) and educational attainment. Although Breslau and colleagues (15) investigated the association between the number of co-occurring conditions and educational attainment, they noted that they did not have an adequate sample size to analyze multiple comorbid conditions simultaneously. The large NESARC sample we used allowed us to complement these earlier studies by analyzing multiple clinical diagnoses in

the same model, taking into account their frequent comorbidity.

We found results similar to those found by Breslau and colleagues (15) with respect to behavioral disorders. Among people who at least entered college, antisocial personality disorder was associated with failure to complete college (OR=1.31, p=.027). Breslau and colleagues analyzed conduct disorder (OR=1.3, p=.166) but not antisocial personality disorder. Similar to their results, our results showed that most anxiety and mood disorders were not significantly associated with failure to complete college, with the major exception of bipolar I disorder (OR=1.70, p=.004). After taking into account illness comorbidity in our model, we found that bipolar I disorder actually had a stronger relationship with failure to complete college than Breslau and colleagues found (OR=1.4 for bipolar I and II combined). Unlike Breslau and colleagues, we did not find that panic disorder (with agoraphobia) had a significant relationship with college completion. Although our results generally agree with those of Breslau and colleagues with respect to illicit drug abuse or dependence, we did not find a significant association between alcohol use disorder and failure to complete college after we controlled for the other *DSM-IV* diagnoses (OR=.99). Breslau and colleagues found a significant association for alcohol abuse (OR=1.3) (15).

Finally, our findings suggest that simultaneously analyzing disorders affected the estimated magnitudes but did not substantially affect the main conclusions. In general, there was a consistent but modest reduction in the strength of the associations across all diagnoses when the other diagnoses were added into the model.

Limitations
Our study had some notable limitations. First, like the studies by Kessler and colleagues (14) and Breslau and colleagues (15), our study was retrospective in nature and likely subject to problems with recall bias. Also, similar to these other studies, in our study the NESARC's large sample made finding statistically significant ORs more likely, but it is critical to

emphasize that our results were not only statistically significant but the point estimates were of magnitudes that were also clinically significant.

Second, we controlled for multiple disorders simultaneously in our final model, but we did not examine patterns of comorbidity by analyzing interactions among disorders. In a sensitivity analysis, we looked at two potentially important interactions (between depression and alcohol and between depression and anxiety), and neither interaction reached statistical significance.

Third, some of the NESARC respondents who reported dropping out of college before degree completion might return (or have returned) to complete their education in the future. Most of the respondents were well above the traditional college age range of 18 to 24, however, and the odds of completing college are only 12% for those who have ever stopped their college education (44).

Fourth, NESARC did not evaluate respondents for attention-deficit hyperactivity disorder, obsessive-compulsive disorder, and psychotic disorders such as schizophrenia. It would be interesting to see how psychosis relates to the association of bipolar disorder with educational attainment, given that psychosis can be disabling and frequently occurs during manic or depressive episodes of bipolar I disorder.

A fifth limitation in using data from NESARC for this analysis was that the lifetime diagnoses were nonhierarchical in nature, meaning that they were made before ruling out possible general medical causes and substance-induced symptoms. We addressed this limitation to a large extent by placing substance use disorders into the multivariable model, in effect controlling for substance abuse and dependence. Given the typical young age range of college students, it is unlikely that general medical conditions played a large role in causing psychiatric symptoms.

A sixth limitation of our study is the fact that we investigated college graduation and not other measures of educational performance, such as number of years in college and grade point average. These outcomes are likely to

be more sensitive and perhaps more affected by many of the psychiatric diagnoses, but they are not available in the NESARC data. Another limitation brought forth by the scope of the NESARC data was the inability to determine whether the respondents had active psychiatric symptoms during college. In sensitivity analysis, we focused only on disorders with an age of onset between 18 and 21, and our main results did not change.

A final limitation was imposed by the scope of educational and sociodemographic variables available in the NESARC data. For example, there is no information on study skills or parents' educational attainment. In addition, we could not control for some of the "early life adversities" that Breslau and colleagues controlled for in their analysis (15). We note, however, that to the extent that these early life adversities cause childhood disorders (rather than affect educational outcomes directly), controlling for them could eliminate some of the effect that we aimed to estimate.

Conclusions
In our analysis of a large NESARC sample of college entrants, we found that four axis I disorders and one axis II disorder had significant and positive relationships with the failure to graduate from college among college entrants. Our study provides new data on which *DSM-IV* diagnoses are most associated with the failure to complete postsecondary education. Overall, our findings suggest that psychiatric factors play a significant role in college graduation, and the benefits of prevention, detection, and treatment may therefore include higher graduation rates.

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