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The epidemiology of DSM-III-R bipolar I disorder in a general population survey

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ABSTRACT

Background. Data are presented on the general population epidemiology of DSM-III-R bipolar I disorder in the United States.

Methods. Data come from the US National Comorbidity Survey (NCS), a general population survey of DSM-III-R disorders. A modified version of the Composite International Diagnostic Interview was used to make diagnoses.

Results. A small ($N = 59$) clinical reappraisal study showed that the only manic symptom profile that could validly be assessed with the CIDI is characterized by euphoria, grandiosity and the ability to maintain energy without sleep, which described approximately half of all clinically validated bipolar I cases in the NCS. Further analysis focused on this symptom profile, which involved $N = 29$ cases in the total sample. Lifetime prevalence was estimated to be 0·4% and 12-month prevalence only slightly lower. Caseness was negatively related to income, education and age, positively related to urbanicity, and elevated among the previously married, never married and non-whites. All cases reported at least one other NCS/DSM-III-R disorder and 59·3% reported that their episode of bipolar disorder (either mania or depression) occurred at a later age than at least one other NCS/DSM-III-R disorder. Although 93·2% of lifetime cases reported some lifetime treatment, only 44·7% of recent cases were in treatment.

Conclusions. The type of bipolar disorder examined here is highly chronic, co-morbid and impairing. Increased efforts are required to attract current cases into appropriate treatment. Methodological research is needed to develop more accurate measures of other bipolar symptom profiles for use in general population epidemiological studies.

INTRODUCTION

This report presents data on the descriptive epidemiology of DSM-III-R bipolar I disorder from the National Comorbidity Survey (NCS) (Kessler *et al*. 1994), a nationally representative survey of the United States. Previous general population surveys of bipolar disorder have largely been based on DSM-III criteria (Canino *et al*. 1987; Bland *et al*. 1988*a*; Hwu *et al*. 1989; Wells *et al*. 1989; Lee *et al*. 1990*a*; Wittchen *et al*. 1992; Chen *et al*. 1993). The topics considered include prevalence, age of onset, course, the ratio of manic to depressive episodes, socio-demographic correlates, co-morbidity, impairment and help-seeking.

METHOD

Sample

The NCS is based on a stratified, multi-stage area probability sample of the non-institutionalized civilian population in the 48 co-terminous United States with a supplemental sample of students living in campus group

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housing. Face-to-face in-home interviews with 8098 respondents were administered between 14 September 1990 and 6 February 1992. The response rate was 82·4%. More details about the NCS sample design have been reported previously (Kessler *et al.* 1994, 1995*a*).

Diagnostic assessment

Diagnostic assessment in the NCS was based on a modified version of the Composite International Diagnostic Interview (CIDI) (World Health Organization, 1990*a*; Wittchen, 1994), a fully structured interview developed to generate diagnoses according to the definitions and criteria of both DSM-III-R (American Psychiatric Association, 1987) and ICD-10 (World Health Organization, 1990*b*) from assessments carried out by trained interviewers who are not clinicians. The modifications elaborated the CIDI in a number of ways, while maintaining the CIDI symptom questions that are required to make diagnoses.

There were two main modifications in the assessment of bipolar disorder. First, the diagnostic stem questions were administered early in the interview as part of a special lifetime review section rather than at the beginning of the diagnostic section. This was done in an effort to increase recall among respondents whose most recent episode occurred long before the interview (Kessler *et al.* 1997). Secondly, the organic exclusion questions were administered for symptoms at the episode level rather than before episode clustering. The CIDI approach is to ask separately about the lifetime occurrence of each symptom that might be part of a manic syndrome (e.g. 'Have you ever had a period when thoughts raced through your head so fast that you could not keep track of them?') and probe positive responses to see if they are always due to organic causes. Once this symptom-level probing is finished, respondents are asked if the symptoms judged not to have always been due to organic causes (even if they were sometimes or even usually due to organic causes) ever occurred together in an episode characterized by either euphoria or irritability and, if so, whether the number of symptoms in this episode was sufficient to meet DSM-III-R criteria (which require euphoria plus at least three additional symptoms or irritability plus at least four additional symptoms). No probes are administered at the episode level to determine whether any of the symptoms in these episodes could have been due to organic factors. The NCS corrected this problem by probing each symptom at the episode level. The same questions as in the CIDI were used for this probing.

WHO Field Trials of the CIDI found very good short-term (1–3 day) test–retest reliability (kappa = 0·78) and validity (kappa = 0·83) in comparison with clinical reinterviews for the diagnosis of DSM-III-R bipolar I disorder (Wittchen, 1994). However, virtually all Field Trial cases were from treatment samples. A clinical reappraisal study was carried out of a representative subsample of 59 NCS community respondents consisting of 31 CIDI cases and 28 noncases who endorsed at least one of the two mania stem questions in the NCS to determine whether the Field Trial results can be generalized to the general population. The non-case subsample was confined to those who endorsed a stem question based on the fact that the probability of finding even a single false negative for a disorder as rare as bipolar disorder would be very small in an unrestricted CIDI non-case subsample. While improving our ability to assess the prevalence of false negatives with a fixed sample size, this procedure makes it impossible to compute total-sample validity statistics such as kappa. However, it is possible to compute an unbiased estimate of the CIDI false positive rate with this design.

The reinterviews were administered by trained clinical interviewers who were blind to the NCS diagnoses and used the SCID (Spitzer *et al.* 1990) to arrive at an independent clinical judgement regarding the presence or absence of bipolar disorder. These interviews, which focused on lifetime disorder, were carried out a minimum of 6 months after the NCS in order to avoid respondent fatigue and minimize the possibility of respondents consciously attempting to be consistent with their earlier reports. Clinical diagnoses were based on consensus of the interviewer, a clinical reviewer, the clinical supervisor (J.M.A.) and a senior clinician experienced in the evaluation of mania (D.R.R.).

The correspondence between the NCS diagnoses of bipolar I and the clinical reinterview diagnoses was poor due to the CIDI classifying more people as cases ($N = 31$) than the clinicians ($N = 10$). The false negative rate was quite low,

with only one of the 28 CIDI non-cases being classified as a case in the clinical interviews. However, the weighted CIDI false positive rate was very high, 70·8% (with a standard error of 8·5%), which means that 70·8% of the respondents classified as bipolar I by the CIDI were not confirmed by clinical reinterviews. Comparison of symptom-level discrepancies among CIDI cases showed that the major reason for the CIDI false positives was that the CIDI made diagnoses when respondents denied ever having euphoria but reported periods of irritability associated with arousal and role impairments that were not classified as indicative of mania by the clinicians. It was possible to develop a revised CIDI diagnostic algorithm based on *post hoc* comparisons that required euphoria (either a period of abnormally elevated mood or a period of being unusually active to a degree that friends and family members were concerned) and associated symptoms of inflated self-esteem or grandiosity and a decreased need for sleep. About one-fourth of the people originally classified as CIDI cases in the clinical reappraisal study (7 of 31) had this symptom profile, the vast majority of whom (six of seven) were classified as cases in the clinical reinterviews.

This symptom profile is typical of euphoric manics seen clinically. It does not characterize all cases, though, as demonstrated by the fact that only six of the ten respondents diagnosed with bipolar I disorder by the clinicians in the reappraisal study were classified as CIDI cases based on this revised algorithm. This result suggests that only about half of true cases in the household population have this symptom profile even though the vast majority of people with this symptom profile are true cases. We were unable to devise an algorithm for other CIDI cases that had acceptable concordance with the clinical diagnoses. Neither were we able to document any validity for an assessment of bipolar II disorder. As a result, we elected to focus on this single symptom profile of bipolar I disorder in subsequent analyses. As noted below, 29 NCS respondents reported a CIDI symptom profile of this sort. These respondents were defined as cases of bipolar I disorder without diagnostic hierarchy rules for the exclusion of cases superimposed on schizophrenia or other psychotic disorders. This exclusion, if it had been imposed, would have affected only two cases of the 29 in the sample.

Analysis procedures

Most of the analyses reported below were carried out with simple computations of means (prevalences), distributions, and cross-tabulations. Odds-ratios were computed by exponentiating the coefficients obtained from logistic regression models using the SAS logistic regression procedure (SAS Institute, 1989). Cumulative age of onset curves were generated using the SAS lifetest procedure. The effects of earlier disorders in predicting the subsequent onset of mania were estimated in discrete-time survival models (Efron, 1988) based on a person-year data array (Kessler *et al.* 1995*b*). The exponentiated coefficients in these survival models can be interpreted as odds ratios (Allison, 1982).

Because of the weighting and clustering of observations in the NCS, special estimation procedures were used to adjust significance tests. This was accomplished by estimating standard errors for prevalences using the Taylor series linearization method (Woodruff & Causey, 1976; Rust, 1985) implemented in the SUDAAN (Shah *et al.* 1991) software package and confidence intervals for odds-ratios using the method of jackknife repeated replications (Kish & Frankel, 1974) implemented in a SAS macro incorporating the logistic regression procedure (SAS Institute, 1989). There are some cases, noted in the text, where the accuracy of the standard errors or confidence intervals can be questioned because of the small number of cases in the denominator of the calculations.

RESULTS

Prevalence

Prevalences are presented in Table 1. Lifetime (LT) prevalence is estimated to be 0·45% ($N = 29$; 0·42% among men and 0·47% among women, $z = 0·2$, $P = 0·835$) and 12-month prevalence to be 0·37% ($N = 19$; 0·40% among men and 0·35% among women, $z = 0·2$, $P = 0·878$). The substantial drop in number of cases with a 12-month disorder compared to a LT disorder without an associated drop in the prevalence estimate is due to the fact that the prevalence estimates are based on weighted data and a handful of cases with large weights can be quite

influential in a situation of this sort. As noted above, however, the effect of weighting is taken into consideration in the computation of the standard errors. Median age of onset in the sample is 21 years. The age of onset distribution does not differ significantly by sex ($\chi^2_1 = 0{\cdot}8$, $P = 0{\cdot}383$).

Table 1. *Prevalence of NCS/DSM-III-R Euphoric–Grandiose* bipolar I disorder*

	Male			Female			Total		
	%	(S.E.)	N†	%	(S.E.)	N†	%	(S.E.)	N†
Lifetime	0·42	(0·17)	17	0·47	(0·22)	12	0·45	(0·14)	29
12-Month	0·40	(0·17)	13	0·35	(0·20)	6	0·37	(0·14)	19

* Euphoric-Grandiose bipolar I disorder = a bipolar I symptom profile characterized by euphoria, grandiosity, and decreased need for sleep.

† These are the unweighted number of respondents in the numerators of the prevalence estimates (the prevalence estimates, in comparison, are based on weighted data).

Manic and depressive episodes

One-fifth (20·3%) of LT cases reported never having a depressive episode, a proportion only weakly related to number of years since onset of mania (point-biserial correlation = 0·04, $P = 0.832$). The average number of manic episodes (mean, 43·4; median, 14) far exceeds the average number of depressive episodes (mean, 23·9; median, 6). Within-person comparisons, however, show that 40·6% of respondents reported having more depressive than manic episodes and that the median proportions of manic and

Table 2. *Co-morbidities between LT Euphoric–Grandiose* bipolar I disorder and other LT NCS/DSM-III-R disorders assessed with cross-sectional odds ratios and with time-lagged discrete-time survival models for prior disorders predicting the subsequent onset of bipolar I disorder*

	LT prevalences of other disorders among respondents with LT bipolar I disorder			Cross-sectional ORs between LT bipolar I disorder other LT disorders	
Other disorders	%	(S.E.)	N†	OR‡	(95% CI)
I Affective disorders					
Major depressive episode	79·7	(7·4)	21	18·4	(3·4–98·7)
Dysthymia	49·6	(9·3)	10	13·6	(8·8–21·1)
Any	90·1	(5·6)	23	36·7	(12·3 – 109·5)
II Anxiety disorders					
Generalized anxiety disorder	42·6	(9·2)	9	13·3	(3·4–52·0)
Agoraphobia	62·4	(8·9)	14	22·7	(10·4–49·4)
Simple phobia	66·6	(8·8)	12	15·3	(4·7–49·2)
Social phobia	47·2	(9·3)	13	5·6	(1·4–22·9)
Panic disorder	33·1	(8·8)	8	13·2	(1·5–114·4)
Post-traumatic stress disorder	38·8	(9·1)	9	7·6	(1·4–42·2)
Any	92·9	(4·7)	25	31·2	(5·0–196·8)
III Substance use disorders					
Alcohol dependence	61·1	(9·0)	15	9·2	(4·9–17·2)
Drug dependence	40·7	(9·1)	11	8·0	(2·2–29·1)
Alcohol abuse	64·2	(8·9)	17	5·8	(2·6–12·8)
Drug abuse	46·1	(9·3)	14	6·6	(1·5–27·9)
Any	71·0	(8·4)	20	6·4	(1·8–22·7)
IV Other disorders					
Conduct disorder	59·4	(9·1)	12	9·6	(1·2–79·3)
Adult anti-social behaviour	29·0	(8·4)	10	7·3	(1·2–44·3)
Any	81·7	(7·1)	18	24·2	(7·2–81·1)
V Aggregate number of disorders					
One +	100·0	(—)	29	(—)	(—)
Three +	95·5	(3·8)	26	69·7	(22·8 – 213·2)

* Euphoric–Grandiose bipolar I disorder = a bipolar I symptom profile characterized by euphoria, grandiosity and decreased need for sleep.

† These are unweighted numbers of respondents classified as manic who also met lifetime criteria for the NCS/DSM-III-R disorder listed in the row heading. The percentage estimates and odds ratios, in comparison, are based on weighted data.

‡ 95% CI does not include 1·0.

OR, odds ratio; CI, confidence interval.

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Table 3. *Lifetime prevalences of suicidal thoughts and suicide attempts among NCS respondents with Euphoric–Grandiose* bipolar I disorder (BPI), unipolar major depression (MD), and other NCS respondents by sex*

	BPI			MD			Other NCS respondents		
	%	(S.E.)†	N‡	%	(S.E.)†	N‡	%	(S.E.)†	N‡
I. Suicidal thoughts									
Male	71·8	(13·3)	8	38·6	(3·1)	187	6·1	(0·6)	201
Female	64·7	(23·7)	9	39·6	(2·0)	360	10·1	(1·7)	243
Total	68·0	(9·2)	17	39·2	(1·7)	547	8·1	(0·9)	444
II. Suicide attempts									
Male	48·7	(19·8)	7	14·1	(2·1)	58	1·5	(0·3)	49
Female	48·1	(21·3)	5	16·2	(2·0)	158	3·6	(0·8)	89
Total	48·4	(13·6)	12	15·4	(1·6)	216	2·6	(0·4)	138

* Euphoric-Grandiose bipolar I disorder = a bipolar I symptom profile characterized by euphoria, grandiosity and decreased need for sleep.

† The estimated standard errors are imprecise because of the small numbers of cases on which the percentage estimates are based.

‡ These are the unweighted number of respondents in the numerators of the prevalence estimates (the prevalence estimates, in comparison, are based on weighted data).

depressive episodes as a fraction of all bipolar episodes are virtually identical (50·2% and 49·8%, respectively).

Although male cases were significantly more likely than female cases to report never having a depressive episode (38·9% *v.* 4·0%), the proportion of cases who reported having a larger number of manic than depressive episodes does not differ greatly by sex (60·4% of men and 45·8% of women). Neither is there either a substantial sex difference in mean number of total episodes of mania and depression combined (75·4 among men and 60·4 among women) or a large sex difference in median number of total episodes (38 among men and 30 among women).

Sociodemographic correlates

Bivariate associations between sociodemographic variables and LT prevalence showed significant associations of age and income. The age effect is most plausibly interpreted as a cohort effect due to a significant difference in the age-of-onset distribution of respondents in the age range 15–34 compared to those 35–54 ($\chi^2_1 = 7{\cdot}7$, $P = 0{\cdot}006$), with higher prevalences throughout the comparable age range among the younger respondents. The income effect shows that cases were significantly more likely than non-cases to have incomes less than $20000 (OR = 15·2, 95% CI = 4·7–49·0). There were also non-significant trends suggesting that cases might be more likely than non-cases to be non-white, unmarried, poorly educated, and to live in urbanized rather than rural areas. (Detailed results of these and other analyses reported in the text are available in an appendix that can be obtained either from the senior author or from the NCS WWW home page. See the acknowledgements section for instructions on how to access the home page.)

Co-morbidity

All of the cases considered here reported one or more other lifetime NCS/DSM-III-R disorders, with the majority (59·3%) reporting that at least one of the other disorders occurred at an earlier age than both their mania and depression. These patterns do not differ by sex. The results in the first column of Table 2 show more detailed LT prevalence estimates of individual NCS/DSM-III-R disorders among cases. Virtually all cases (92·9%) reported at least one LT anxiety disorder, while 71·0% reported at least one LT substance use disorder, 81·7% reported a history of either conduct disorder (CD) or adult antisocial behaviour (AAB) and 95·5% reported having three or more of the above disorders in their lifetime. The odds-ratios in the third column of Table 2, ranging between 5·6 for social phobia and 22·7 for agoraphobia, compare the 29 bipolar cases with all other NCS respondents and show that these prevalences are all significantly higher among the former than the latter. The odds-ratio for any LT anxiety disorder (31·2) is especially high.

The results in the last two columns of Table 2

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show odds ratios and their confidence intervals obtained from a series of bivariate discrete-time survival models in each of which prior history of one other NCS/DSM-III-R disorder was used as a time-varying predictor of the subsequent onset of bipolar I disorder. The ORs are consistently greater than 1·0 and four are significant at the 0·05 level, indicating that they predict an increased probability of first onset of bipolar disorder. Three of the four significant coefficients are associated with anxiety disorders (GAD, PTSD, any anxiety), while the fourth is associated with prior history of either conduct disorder or adult antisocial behaviour. It is noteworthy that the ORs are all smaller than the comparable values in the second column of the table and that this difference is especially pronounced for the anxiety disorders, indicating that only part of these co-morbidities are due to other disorders predicting the onset of temporally secondary bipolar disorder.

Although the aggregate measures of substance use disorders in Table 2 are not significant predictors of subsequent bipolar disorder, more detailed disaggregated analyses (available from the NCS WWW home page) showed that there are effects of specific substances. Cocaine was the only drug for which prior use had a meaningfully elevated odds ratio (4·2; 95% CI: 0·3–57·2) in predicting subsequent onset of bipolar disorder, a result consistent with a prospective epidemiological investigation by Anthony & Petronis (1991) based on the ECA data. Stimulant abuse (OR = 3·1, 95% CI: 1·0–9·9) and dependence (OR = 5·7, 95% CI: 1·8–18·4) were the only illicit drug use disorders with estimable odds ratios that meaningfully predicted subsequent bipolar disorder.

Suicidality

The results in Table 3 present data on lifetime prevalences of suicidal thoughts and attempts, separately among the 29 NCS respondents with LT bipolar I disorder, those with LT unipolar major depression, and other NCS respondents. More than two-thirds of NCS respondents with LT bipolar I disorder (68·1%) reported having suicidal thoughts ('seriously thinking about committing suicide') at some time in their life, while 48·4% made a suicide attempt. These prevalences are significantly higher than those found among either respondents with unipolar major depression ($z = 1·8$, $P = 0·069$ for thoughts; $z = 3·1$, $P = 0·002$ for attempts) or other NCS respondents ($z = 6·8$, $P < 0·001$ for thoughts; $z = 7·2$, $P < 0·001$ for attempts). There is no meaningful male–female difference in the prevalences of either suicidal thoughts (71·8% *v.* 64·7%) or attempts (48·7% *v* 48·1%) among respondents with LT bipolar I disorder, although the bases on which these differences are computed are too small to assume that the estimates are reliable.

Help-seeking

Virtually all (93·2%) respondents with LT bipolar I disorder reported being in treatment at some time in their life and 44·7% of those with a 12-month disorder reported being in treatment during the year prior to the interview. Approximately half (47·2%) of those in past year treatment were treated in the health care sector (all of them seen by a mental health specialist) compared to 87·0% whose treatment was in the human services sector and/or the self help sector.

DISCUSSION

Limitations

The above results are based on only 29 cases who are believed to represent only about half of bipolar I cases in the population. The small number of cases leads to imprecision in parameter estimates. The incomplete coverage makes it impossible to compare results rigorously with those from other studies. The first of these two limitations is due to the rarity of bipolar I disorder in the population. The only hope of addressing this problem in community samples is to build up a picture across a number of major epidemiological surveys. The present report should be seen as an attempt to begin this process of cumulation for the subset of CIDI cases who can reasonably be considered to be true bipolars. A number of other large CIDI surveys are currently underway in other countries around the world, so the goal of cumulation across studies is a realistic one that could well be realized over a short period of time. The fact that the cumulation will require us to focus on only the subset of bipolars who have a symptom profile characterized by euphoria, grandiosity and the ability to maintain energy without sleep is unfortunate because it limits external validity.

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However, this restriction is necessary because this is the only manic symptom profile that is accurately assessed in the current version of the CIDI. Any analysis that studies the broader CIDI definition of bipolar I disorder is, in effect, doing nothing more than studying this subsample of bipolars along with a group of false positives. Improvement in the accuracy of assessment of other bipolars in the CIDI is required to correct this situation. Given the fact that a number of research groups are currently working with this version of the CIDI, we believe that the best option is the one we have taken here; to focus on the validly assessed subsample of bipolars and explicitly acknowledge that we have no way to study other bipolars with this instrument. It is likely that cases with the valid symptom profile differ clinically from others with bipolar disorder due to the very high co-morbidity of this profile with anxiety and the fact that comorbid anxiety is known to be related to a severe illness course of bipolar disorder. Recent research in clinical samples has also shown that there are important differences in the clinical correlates of euphoric versus dysphoric symptom profiles of bipolar disorder (Post *et al.* 1989).

Prevalence

The lifetime prevalence estimate of bipolar I disorder in the NCS using the original CIDI definition is 1·6% (Kessler *et al.* 1994), which is at the upper end of the range of prevalences found in previous epidemiological surveys, which have ranged between 0·5 and 1·6% (Canino et al., 1987; Bland *et al.* 1988*b*; Hwu *et al.* 1989; Wells *et al.* 1989; Lee *et al.* 1990*a*; Wittchen *et al.* 1992; Chen *et al.* 1993). The lifetime prevalence estimate of the narrow definition of bipolar I disorder used in the current report is 0·45%. As this profile characterizes only about half of the respondents in the clinical reappraisal subsample diagnosed by the SCID as having bipolar I, the true LT prevalence of this disorder in the household population is likely to be approximately 0·9%.

Age of onset

Our finding of an average age of onset of 21 is consistent with the median onset ages in the late teens to early twenties found in treatment samples of patients with bipolar I disorder (Goodwin & Jamison, 1990). Our failure to find a sex difference in the age of onset distribution is consistent with the results of previous studies in both treatment samples (Taylor & Abrams, 1981; Coryell & Winokur, 1992) and community samples (Burke *et al.* 1990).

Course

The finding that the vast majority of cases had episodes in the year prior to interview is consistent with evidence from treatment studies that bipolar disorder is a very chronic disease (Coryell & Winokur, 1992). The median numbers of manic (14) and depressive (6) episodes found here are also similar to those in treatment samples (Clayton, 1981). The finding that 20% of cases never had a depressive episode is within the range of 5 to 28% reported in clinical studies (Abrams *et al.* 1979; Andreasen *et al.* 1988; Wolf *et al.* 1988; Fogarty *et al.* 1994). However, the finding that this proportion is much greater for men (38·9%) than women (4·1%) is a new result requiring replication. Our failure to find a strong relationship between number of years since first onset of mania and probability of ever having a depressive episode suggests that few unipolar manics with the symptom profile considered here will subsequently have depressive episodes. Unlike the results of treatment studies (Dunner & Hall, 1980; Taylor & Abrams, 1981; Roy-Byrne *et al.* 1985), we failed to find that women reported either a larger overall number of lifetime episodes of mania and depression combined or a higher proportion of depressive than manic episodes, failures that could be due to our exclusive focus on a single symptom profile.

Sociodemographic correlates

The finding that the symptom profile considered here is negatively related to income and education, while consistent with other epidemiologic surveys (Smith & Weissman, 1992), is inconsistent with the clinical observation of a positive association between bipolar disorder and socioeconomic status (Winokur *et al.* 1969; Woodruff *et al.* 1971; Weissman & Myers, 1978; Krauthammer & Klerman, 1979; Welner *et al.* 1979). This discrepancy could be due to more socially advantaged cases having a higher probability than others of obtaining speciality treatment or

to a relationship between socio-economic status and accuracy of diagnosis of bipolar disorder.

The elevated prevalence among respondents in the age range 15–34 compared to older respondents is also consistent with previous research (Canino *et al.* 1987; Bland *et al.* 1988*a*; Wells *et al.* 1989; Wittchen *et al.* 1992). This could be due to bipolar disorder becoming more prevalent in recent cohorts. Or it could be due to selection processes. The latter could include the fact that bipolars have a much higher risk of early death than others in the population due to high rates of suicide (Tsuang *et al.* 1980), accidental death (Weeke & Vaeth, 1986) and cardiovascular and respiratory disorders (Sharma & Markar, 1994). Selection biases associated with differential rates of residence in the household population and differential co-operation could also be involved.

The trend finding that prevalence is elevated among non-whites is consistent with the broader evidence in the NCS that this type of mania is more prevalent among people from disadvantaged sectors of society. The trend finding of elevated prevalences among non-married people is consistent with previous research (Goodwin & Jamison, 1990; Weissman *et al.* 1991) and presumably is due to selection processes. The trend finding of a higher prevalence in urban than rural areas is consistent with the ECA Study (Weissman *et al.* 1991), but inconsistent with epidemiological surveys conducted outside the United States which have consistently failed to find an urban–rural difference in mania (Canino *et al.* 1987; Hwu *et al.* 1989; Lee *et al.* 1990*b*). This discrepancy raises an intriguing question concerning a possible cross-national difference in the relationship between bipolar disorder and urbanicity. Finally, our failure to find a male–female prevalence difference is consistent with previous research (Egeland & Hostetter, 1983; Hwu *et al.* 1989; Wells *et al.* 1989; Burke *et al.* 1990; Lee *et al.* 1990*a*; Weissman *et al.* 1991; Chen *et al.* 1993).

Co-morbidity

The finding that the symptom profile considered here is highly co-morbid with other NCS/DSM-III-R disorders is consistent with evidence of high co-morbidity in bipolar disorder from both treatment samples (Andreasen *et al.* 1988; Black *et al.* 1988; Kutcher *et al.* 1989; Côté & Hodgins, 1990; Brady & Lydiard, 1992) and general population samples (Regier et al., 1990; Robins *et al.* 1991). While alcohol and drug disorders are usually found to be the most prevalent co-morbid disorders in treatment samples, co-morbid anxiety disorders were found to be much more common in our analysis. This difference could reflect an impact of co-morbid substance use disorders on increased probability of help-seeking or an especially high co-morbidity with anxiety among bipolars having the symptom profile that was the focus of our analysis. The evaluation of this second possibility in treatment samples would be of particular interest in light of evidence that high co-morbidity with anxiety disorders is associated with poor treatment response and worse outcome in patients having both unipolar and bipolar disorders (Murphy, 1980; Roth, 1981; Van Valkenburg *et al.* 1984).

The high co-morbidities documented above could be due to an number of causal processes, including the possibility of an impact of earlier disorders on subsequent bipolar disorder, possibly by precipitating mood disorder in genetically predisposed individuals, an effect of bipolar disorder on the subsequent onset of other disorders, an effect of some underlying vulnerability shared by bipolar disorder and other conditions, or some combination of these processes. In the case of co-morbidities involving substance use, it is also possible that substance-related problems could represent attempts to modulate the mood lability associated with bipolar disorder or that they could be symptoms of mood disturbance. Although the NCS design does not allow us to sort out these various possibilities, we were able to examine temporal priority between bipolar disorder and co-morbid disorders. The results showed that first onset of both manic and depressive episodes usually occurred after the prior onset of some other co-morbid disorder. Consistent with this finding, our survival analysis showed that prior anxiety disorders, cocaine use, stimulant abuse or dependence, conduct disorder, and adult anti-social behaviour are associated with an increased risk of the subsequent onset of bipolar disorder.

It is unclear why anxiety disorders should predispose to this type of bipolar disorder, but both genetic and environmental mechanisms are possibilities worthy of future consideration. The

finding that cocaine use and stimulant use disorders predict subsequent bipolar disorder is consistent with the suggestion of several authors that drugs can precipitate bipolar illness (El-Guebaly, 1975; Weller *et al.* 1988) as well as with the finding of Post *et al.* (1986) that cocaine is a powerful inducer of kindling, a sensitization-like process that may be a model for the development of bipolar illness. The findings that conduct disorder (CD) and adult antisocial behaviour (AAB) are associated with a significantly increased risk of subsequent mania are, at least superficially, consistent with the findings regarding the effects of drug use disorders. However, it is also important to recognize that the antisocial behaviours giving rise to diagnoses of CD and AAB could be early expressions of bipolar disorder. This sort of symptom overlap is one of a number of diagnostic complexities that makes it difficult to distinguish temporal order of early-onset disorders with subsequent mania in the absence of detailed longitudinal investigation (Bukstein *et al.* 1989).

Impairment and suicidality

Pathogenic speculations notwithstanding, the consequences of high co-morbidity are likely to be untoward. The finding that the cases considered here are 15 times as likely as others to be in the lowest income category at the time of study is consistent with this inference. Another striking indicator of adverse life consequences is the finding that the majority of the cases considered here had serious suicidal thoughts and that close to half made suicide attempts at some time in their life. The 48% rate of suicide attempts is within the range of 20% to 60% reported in 13 clinical studies summarized by Goodwin & Jamison (1990). Our failure to find a sex difference in suicidality is also consistent with the results of clinical studies (Barner-Rasmussen, 1986; Dilsaver *et al.* 1993; Isometsä *et al.* 1994).

Help-seeking

The vast majority of cases reported treatment at some time in their life. However, our results are less encouraging than the ECA Study regarding bipolars in recent treatment. Whereas 60·9% of the people defined as bipolar in the ECA Study reported being in treatment at some time during the year prior to interview and 88·8% of those in treatment were being treated in the health care sector, only 44·7% of the more narrowly defined bipolars in the NCS were in treatment over the past year and only 47·2% of the latter were treated in the health care sector. It is conceivable that this difference in results is due to the fact that the ECA definition of bipolar disorder was broader than the NCS definition, although this would seem to be unlikely in light of the fact that this broader definition presumably includes less impaired people. A more likely possibility, we believe, is that the largely urban sample of the ECA Study produced help-seeking patterns that are atypical of the entire country. Whatever the case may be in this regard, the results of the NCS data are quite clear in showing that only one-fifth of recent cases with a euphoric-grandiose symptom profile in the US household population are in treatment for this disorder with a health care professional in a year. Given the considerable impairment associated with bipolar disorder and the availability of effective pharmacotherapy for those who seek health care treatment, this low rate of service contact suggests that increased efforts are needed to attract and to maintain these patients in appropriate treatment.

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Cottler, Andrew Heath). A complete list of all NCS publications along with abstracts, study documentation, interview schedules, and the raw NCS public use data files can be obtained directly from the NCS home page by using the URL: `http://www.umich.edu/~ncsum/`.

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