

Psychiatric Disorder in a Birth Cohort of Young Adults: Prevalence, Comorbidity, Clinical Significance, and New Case Incidence From Ages 11 to 21

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Mental health data were gathered at ages 11, 13, 15, 18, and 21 in an epidemiological sample using standardized diagnostic assessments. Prevalence of *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed. revised; American Psychiatric Association, 1987) mental disorders increased longitudinally from late childhood (18%) through mid- (22%) to late-adolescence (41%) and young adulthood (40%). Nearly half of age-21 cases had comorbid diagnoses; and comorbidity was associated with severity of impairment. The incidence of cases with adult onset was only 10.6%; 73.8% of adults diagnosed at age 21 had a developmental history of mental disorder. Relative to new cases, those with developmental histories were more severely impaired and more likely to have comorbid diagnoses. The high prevalence rate and significant impairment associated with a diagnosis of mental disorder suggests that treatment resources need to target the young adult sector of the population. The low new-case incidence in young adulthood, however, suggests that primary prevention and etiological research efforts need to target children and adolescents.

In response to a charge from the U.S. Congress to recommend a policy-oriented and long-term prevention research agenda, the Committee on Prevention of Mental Disorders of the Institute of Medicine (1994) recently issued a call for research into the epidemiology of mental disorders among young adults. Spe-

cifically, the Institute of Medicine report noted that there were no studies of the incidence of new cases of disorder during the transition to adulthood.

The transition to adulthood is a critical period in the life course with important implications for subsequent achievements and behaviors. It is the stage of life devoted to making major choices in multiple life spheres. Because the stakes for a successful transition from adolescence to adulthood are particularly high, the emergence of mental illness in young adulthood may have even more serious and long-lasting consequences than at other stages of the life course.

The goals of this study were to examine empirically the nature and scope of mental illness during this transitional period from adolescence to young adulthood. Toward this end, five major questions were addressed concerning (a) prevalence, (b) comorbidity, (c) functional impairment that is due to mental disorders, (d) change in prevalence from early adolescence to young adulthood, and (e) the incidence of new cases of disorder as they emerge by young adulthood. We addressed these questions by describing mental disorders occurring in an epidemiological sample that has been followed longitudinally with repeated prospective assessments of mental health from childhood to age 21.

What Is the Prevalence of Mental Disorders Among Young Adults?

Currently, the best available data on the prevalence of mental disorders in young adults in the United States come from two

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major cross-sectional epidemiological surveys: the Epidemiologic Catchment Area (ECA) program and the National Comorbidity Survey (NCS). The ECA was designed to identify the prevalence of disorders assessed by criteria from the *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed.; *DSM-III*; American Psychiatric Association, 1980) by surveying five community and institutionalized patient samples. Data available on a subsample of 18- to 29-year-olds indicated that as many as one in four young adults suffered from a mental disorder within the past year (Robins & Regier, 1991). Subsequently, the NCS was implemented to provide information about the third revised *DSM-III* (*DSM-III-R*; American Psychiatric Association, 1987) mental disorders in a national probability sample of noninstitutionalized civilians across the 48 continental United States (Kessler et al., 1994). In the NCS cross-sectional sample, which ranged from 15 to 54 years of age, nearly 30% were identified with a mental disorder within the past 12 months; the highest prevalence rate for mental disorders (approximately 37%) was associated with the youngest age cohort of 15- to 24 year-olds. Outside of the United States, in a large epidemiological sample studied in Israel, the 6-month prevalence for disorders meeting the probable-definite level using the Research Diagnostic Criteria (RDC; Spitzer, Endicott, & Robins, 1981) was approximately 30% for a cohort of young adults, aged 24 to 33 (Levav et al., 1993). Epidemiology must rely on cumulative evidence from multiple studies to establish facts about prevalence of mental disorders in populations. In this study, we add to the accumulating knowledge about prevalence by using *DSM-III-R* criteria to identify 1-year prevalence rates for 15 different mental disorders in an unselected birth cohort of 21-year-old men and women born in Dunedin, New Zealand.

How Much Comorbidity Among Disorders Is Associated With Mental Illness in Young Adults?

Comorbidity among mental disorders has important implications for theory, method, and intervention (e.g., Clark, Watson, & Reynolds, 1995). The empirical observation that certain disorders are likely to co-occur within individuals can inform revisions of taxonomic and diagnostic systems and influence how researchers identify risk factors, select samples, target treatments, and evaluate outcomes. In primary prevention, known comorbidity among mental disorders means that symptoms of one disorder can be used to identify populations at risk for a second disorder. High rates of comorbidity require that clinicians who evaluate patients consider the full diagnostic picture, not only the initial symptom presentation. Comorbidity affects the severity of impairment and differential efficacy of specific treatments for mental illness (Caron & Rutter, 1991).

In light of selective treatment-seeking among comorbid cases, rates obtained from clinic-based samples tend to be overestimates (e.g., "Berkson's bias"; Berkson, 1946). Only epidemiological surveys can identify rates and patterns of comorbidity among disorders as they occur in the general population (Caron & Rutter, 1991). Such studies have shown that observed comorbidity rates in the general population are indeed consistently greater than rates expected by chance alone. The ECA and NCS studies estimated that at least half of the adults diagnosed had

more than one co-occurring mental disorder (Kessler et al., 1994; Robins & Regier, 1991). This study extends the knowledge about comorbidity among mental disorders in the general population—specifically targeting young adults—and provides data relevant to the overlap among different *DSM-III-R* disorders.

How Much Functional Impairment Is Associated With Mental Illness in Young Adulthood?

In clinical settings, it is a reasonable assumption that treatment is sought because the patient's functioning is impaired. However, epidemiological studies consistently find rates of mental illness that far exceed the rates of service use. Estimates indicate that only 10% to 30% of the cases with disorder receive any treatment (Institute of Medicine, 1994). This disparity raises the question of whether all or most cases in the population who meet diagnostic criteria experience a level of functional impairment that warrants intervention. In this study, to ascertain the impact of mental illness on young adults in the general population, we obtained multiple indices of clinically significant impairment from three independent reporting sources: the study members themselves, an elected informant, and public records.

Does the Prevalence of Mental Disorders Increase During the Transition to Adulthood?

Young adulthood has been hypothesized to be the peak risk period for the development of mental illness (Burke, Burke, Regier, & Rae, 1990; Institute of Medicine, 1994). If this is true, research should seek to identify developmental factors specific to young adulthood that increase the risk of mental disorder, as compared with other phases in the life span. The hypothesis that young adults are at increased risk for mental disorders is based on recent cross-sectional studies that showed that young adult cohorts had higher period-prevalence rates than older cohorts (Kessler et al., 1994; Robins & Regier, 1991). Peaking prevalence rates in young adulthood can also be inferred by extending upward the trend observed in studies of children and adolescents, which show the highest rates of mental disorder among the oldest adolescents relative to the younger age groups (Cohen et al., 1993; Links, Boyle, & Offord, 1989; McGee, Feehan, Williams, & Anderson, 1992).

The hypothesis that mental disorders peak in young adulthood remains speculative as the evidence for age differences has been cross-sectional. Cross-sectional studies are limited to assessing differences between age cohorts and, thus, confound age effects with cohort effects (Nesselroade & Baltes, 1979). Actual developmental changes in prevalence rates can only be demonstrated by repeated prospective assessments of the same age cohort in a longitudinal design. (Although a longitudinal study of a single cohort still cannot control for historical period or exposure effects, it is a necessary step to demonstrating age-related, i.e., developmental, changes). We report here the first longitudinal test of the hypothesis that prevalence rates of mental disorders increase with age, using repeated diagnostic assessments from ages 11 to 21.

What Is the Incidence of New Cases in Young Adulthood?

Incidence refers to the rate of newly active cases of disorder in a population. It is a critical statistic for estimating the age of onset and for guiding the timing of prevention efforts. In considering mental health services, for example, it is important to establish the phase in the life span where there is the greatest onset of new cases of a disorder so as to schedule interventions early enough to prevent onset. Despite a growing number of epidemiological studies with child and adult samples, very little is known about new case incidence during the transition period to adulthood, between ages 15 and 25 (Institute of Medicine, 1994; Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993). To address the absence of studies, the Institute of Medicine Committee on Prevention of Mental Disorders (1994) has called for the use of longitudinal designs with repeated waves of assessment, implementing standardized methods of psychiatric diagnosis from childhood to adulthood. Such designs are required to identify disorder emerging for the first time in the life of the individual member of an epidemiological sample. The present study addresses this gap in epidemiological knowledge by prospectively studying the new case incidence of *DSM-III-R* disorders in a sample that has been assessed at ages 11, 13, 15, 18, and most recently, age 21.

Method

Sample

Participants were members of an unselected birth cohort that has been studied since birth in the Dunedin Multidisciplinary Health and Development Study (DMHDS). The history of the study has been described in detail by Silva (1990). Briefly, the study is a longitudinal investigation of the health, development, and behavior of a complete cohort born between April 1, 1972, and March 31, 1973, in Dunedin, a city of approximately 120,000 on New Zealand's South Island. Perinatal data were obtained at delivery, and when the children were later traced for follow-up at the age of 3, 91% of the eligible births participated in the assessment, providing a base sample of 1,037 (52% male, 48% female) for the longitudinal study. The birth cohort has been reassessed with a diverse battery of psychological, medical, and sociological measures at ages 3 ($n = 1,037$), 5 ($n = 991$), 7 ($n = 954$), 9 ($n = 955$), 11 ($n = 925$), 13 ($n = 850$), 15 ($n = 976$), 18 ($n = 1,008$), and 21 ($n = 992$) years. With regard to social stratification, the children's fathers were representative of the social class distribution in the general population of similar age in New Zealand. With regard to racial distribution, the study members were of predominantly European ancestry. Fewer than 7% of the sample identified themselves at age 18 as Maori or Polynesian, which matches the ethnic distribution of the South Island of New Zealand.

In 1993-1994, 97.3% of the living study members gave informed consent to participate in the follow-up assessment at age 21. Interviews about mental health were collected on 961 21-year-olds (492 men, 469 women). Mental health data at age 21 were missing for 76 members of the original sample (7.3%): 17 persons had died since the age of 3, 9 were not located, 19 refused to participate in the entire study, and 31 were interviewed by telephone but were not asked questions about mental health. The 76 nonrespondents were compared with those who did participate on measures taken at the study's inception to determine whether the participants at age 21 were still representative of the original cohort. The nonrespondents did not differ from the participants at age

21 on measures of parental socioeconomic status (SES) at birth, $t(939) = 1.35, p = .18$; race, $\chi^2(1, N = 1,028) = 0.41, p = .52$; or sex, $\chi^2(1, N = 1,037) = 1.26, p = .26$.

Assessment of Mental Disorder at Age 21

Diagnoses were determined using a modified version of the Diagnostic Interview Schedule (DIS; Robins, Helzer, Croughan, & Ratcliff, 1981). The modifications made to the DIS for the Dunedin study have been described in detail by Feehan and colleagues (1994). Briefly, the DIS was modified in four ways: (a) to limit questions to the assessment of *DSM-III-R* criteria only, (b) to limit the assessment of symptoms to those occurring within the past 12 months only, (c) to limit assessment to only the more commonly occurring diagnoses, and (d) to limit response options to "0 = no," "1 = yes, sometimes," and "2 = yes, definitely." Only those responses receiving a "2" were considered severe enough to be entered into the diagnostic algorithm. Diagnoses were determined by computer-run algorithms that followed explicit criteria specified by the *DSM-III-R*.

The 15 disorders diagnosed at age 21 included the following: (a) six anxiety disorders: generalized anxiety disorder, obsessive-compulsive disorder, panic disorder, agoraphobia, social phobia, and simple phobia; (b) three mood disorders: major depressive episode, manic episode, and dysthymia; (c) two eating disorders: anorexia nervosa and bulimia nervosa; (d) two substance disorders: alcohol dependence and marijuana dependence; (e) one Axis-II *DSM-III-R* disorder: antisocial personality disorder; and (f) one category of nonaffective psychosis, which consisted of the positive psychotic symptoms (Criterion A of the *DSM-III-R*, pp. 194-195) for the diagnosis of schizophrenia and schizophreniform disorders, with the exclusion of such symptoms occurring solely under the influence of alcohol or drugs, or during a major depressive episode.

Interrater reliability on coding the items of the modified DIS interview was examined using a subsample of 28 consecutive participants. Two examiners independently encoded the responses on the basis of audiotaped mental health interviews. Because base rates of individual disorders in the subsample were low, kappa coefficients were computed for diagnoses within each of the major groups of anxiety disorders, mood disorders, eating disorders, and substance use disorders. The kappa coefficients for the independently rated diagnoses were all above .85.

Measures of the Clinical Significance of Impairment

Seven different indices of the clinical significance of the impairment associated with a diagnosis of mental disorder were assessed through a variety of self-report and other sources.

Functional interference. Respondents who reported symptoms in any of the major modules of the mental health interview were then asked to rate the level of interference they experienced in work and daily activities associated with those symptoms. The Likert-type scale ranged from 1 (*very little*) to 5 (*very much*) and was used following the modules for the anxiety disorders, mood disorders, eating disorders, substance disorders, and psychotic disorders. Scores of 2 or greater on these scales indicated impairment.

Mental health services. Help-seeking behavior was assessed during the mental health interview by questions taken from the modified Health Services Utilization questionnaire used in earlier phases of this and other studies (Feehan et al., 1994). Using the reporting period of the past 12 months, participants were asked whether they had sought general medical, psychiatric, psychological, or other services for psychiatric symptoms. They were also asked about hospitalizations for psychiatric symptoms and any psychotropic medications taken that year.

Suicidality. Study members were asked about any suicide attempts

made during the past 12 months. Attempts were counted whether they required medical attention or not.

Criminal conviction. Computerized records of participants' court convictions at all courts in New Zealand and Australia were obtained by searching the central computer system of the New Zealand police. The conviction records did not include traffic offenses, with the exception of driving under the influence of alcohol or criminally negligent driving. Informed consent for the search was obtained at the age-21 assessment.

Informant report. An index of functional impairment was based on the endorsement of observed symptoms in a mail questionnaire completed by a significant other nominated by the study member as someone who knew them well. Of the 961 participants in the age-21 interviews, 914 (95.1%) nominated informants who returned valid questionnaires. Informants identified themselves as spouses or partners (36.9%), parents (30.6%), close friends (22.3%), or other relations (10.2%) of the study member. The questionnaire included a series of positive and negative attributes on which the informant rated the study member. Thirteen of the items represented the principle signs of mental disorders for each of the major categories of the DIS worded in a general manner such as "feeling depressed, miserable, sad, or unhappy" or "problems related to the use of alcohol." Informants rated items as "0 = does not apply," "1 = yes, applies somewhat," and "2 = yes, definitely applies." Ratings of 2 for any of these 13 items were considered significant for the purpose of an other person's corroboration of signs of mental disorder.

Results

One-Year Prevalence of Disorder

The 1-year prevalence rate of psychiatric disorder, assessed by diagnostic interview at age 21, was 40.4% in the Dunedin sample. A total of 389 young adults reported having symptoms within the past year that met *DSM-III-R* diagnostic criteria for one or more of the 15 disorders assessed. Table 1 contains the specific 1-year prevalence rates as well as the number of cases meeting criteria for each of the 15 disorders assessed.

The most prevalent single disorder was major depressive episode, with a 1-year rate of 16.8%. The second most prevalent disorders were the substance disorders, including alcohol and marijuana dependence, and the anxiety disorders, especially social and simple phobia, all with rates approaching 10% of the sample. The least prevalent disorders in this sample, at about 1%, were panic disorder and the eating disorders, anorexia nervosa and bulimia nervosa.

Table 1 also shows the prevalence rates and relative risk ratios by sex computed for each of the disorders. The overall rate for having any psychiatric disorder did not differ significantly by sex, $\chi^2(1, N = 961) = 2.14, p = .14$. However, the relative risk ratios for men and women varied over the 15 disorders. Among specific disorders, women had higher rates of phobic disorders (agoraphobia, social phobia, and simple phobia), depressed mood disorders (major depressive episode and dysthymia), and eating disorders (anorexia and bulimia nervosa, although not significant with so few cases). In contrast, men had higher rates than women for the substance disorders (alcohol and marijuana dependence) and antisocial personality disorder.

Comorbidity of Disorders

The last column of Table 1 shows that nearly half (47.3%) of the respondents who were diagnosed with any one psychiatric

disorder were likely to be diagnosed with multiple disorders. Specifically, 20.9% of cases had two diagnoses and 26.4% had three or more diagnoses, with one individual meeting criteria for a maximum of nine separate diagnoses. The overall risk of comorbidity did not differ significantly by sex, $\chi^2(1, N = 389) = 1.95, p = .16$. Comorbidity was greatest for generalized anxiety disorder and panic disorder in that there were no pure cases of either of these two disorders. Disorders with the lowest rates of comorbid cases were simple phobia, major depressive episode, alcohol dependence, and marijuana dependence. In each of these four disorders approximately one third of the cases had no coexisting disorder. (A table showing rates of comorbidity between each of the 15 disorders is available from the authors.) Note, however, that data on comorbid patterning may be unstable where base rates for specific disorders are very low.

To better understand the substantive nature of comorbidity, we grouped disorders into three families. The three major groupings included the six different anxiety disorders, the three different mood disorders, and the two different substance disorders. (Eating disorders were not included because of low statistical power with only 13 cases). Comorbidity within each family of disorders was calculated. Within anxiety disorders, 37.9% of the total of 195 anxiety cases had more than one type of anxiety diagnosis. Within the mood disorders, 15.1% of the 179 cases were diagnosed with more than one mood syndrome (predominantly major depressive episode and dysthymia). Of the 155 cases with substance disorder, 19.5% had both alcohol and marijuana dependence.

Figure 1 shows that there were also substantial levels of comorbidity across the three families of disorders: anxiety, mood, and substance. Consistent with clinical observations of concurrent depressive and anxious symptomatology, there was a statistically significant odds ratio of 5.7 (within 95% confidence interval) for having both a mood disorder and an anxiety disorder in this sample. Odds ratios for dual diagnoses of substance disorder with anxiety disorder (1.8) or with mood disorder (2.8) were of lesser magnitudes but remained statistically significant at the 95% level of confidence.

Clinical Significance of Impairment Caused by Disorder

The high prevalence rates of disorder raise questions about the clinical significance of diagnoses and whether meeting *DSM-III-R* criteria by self-report in our study constitutes real impact on daily functioning. Table 2 presents the percentage of cases for each diagnostic category who experienced significant functional impairment. The seven indices of impairment included five self-report variables and two variables from independent reporting sources. The final column in Table 2 represents a summary variable for the presence of any of the seven possible indices.

With respect to functional interference, most individuals with psychiatric disorders (97.9%) reported that their symptoms interfered to some degree in performing work or daily activities. Individuals with eating disorders, panic disorder, and major depressive episode were most likely to experience their symptoms as interfering with their daily functioning. Persons with substance disorders reported the least interference resulting from their symptoms, but even with these cases, nearly three

Table 1
One-Year Prevalence Rates, Relative Risk Ratios by Sex, and Comorbidity Rates of DSM-III-R Psychiatric Disorders at Age 21

Disorder	% (and n)			Sex ratio (female:male) ^a	Comorbidity (% ≥ 2 diagnoses)
	Female	Male	All		
Any psychiatric disorder	42.4 (199)	38.6 (190)	40.4 (389)	1.1:1	47.3
Anxiety disorders					
Generalized anxiety disorder	2.4 (11)	1.4 (7)	1.9 (18)	1.7:1	100
Obsessive-compulsive disorder	7.8 (36)	6.4 (31)	7.1 (67)	1.2:1	86.6
Panic disorder	0.9 (4)	0.4 (2)	0.6 (6)	2.3:1	100
Agoraphobia	5.8 (27)	1.8 (9)	3.8 (36)	3.2:1*	83.3
Social phobia	12.5 (58)	7.0 (34)	9.7 (92)	1.8:1*	71.7
Simple phobia	13.5 (63)	3.5 (17)	8.4 (80)	3.9:1*	70.0
Mood disorders					
Major depressive episode	22.6 (106)	11.2 (55)	16.8 (161)	2.0:1*	67.1
Manic episode	1.9 (9)	2.1 (10)	2.0 (19)	1:1.1	84.2
Dysthymia	4.1 (19)	1.9 (9)	3.0 (28)	2.2:1*	96.4
Eating disorders					
Anorexia nervosa	0.9 (4)	0.0 (0)	0.4 (4)	—	75.0
Bulimia nervosa	1.5 (7)	0.4 (2)	1.0 (9)	3.8:1	88.9
Substance disorders					
Alcohol dependence	5.8 (27)	13.7 (67)	9.8 (94)	1:2.3*	69.1
Marijuana dependence	4.7 (22)	14.3 (69)	9.6 (91)	1:3.0*	58.2
Antisocial personality disorder	0.6 (3)	5.7 (28)	3.2 (31)	1:9.5*	74.2
Nonaffective psychosis	3.2 (16)	4.8 (23)	4.1 (39)	1:1.5	84.6

Note. Sample size fluctuates across diagnoses from 939 to 957 because of missing data. DSM-III-R = *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed., revised).

^a Sex ratios followed by an asterisk indicate that the relative risk for disorder in one sex is significantly greater than 1 at the 95% confidence level. Ratio is not computed where there were zero cases of a disorder.

fourths (70.3%) noted significant disturbance in their functioning.

With respect to clinical treatment, individuals identified with disorders reported having sought professional mental health

services in the past year significantly more often than the non-disordered study members (25.1% vs. 7.7%), $\chi^2(1, N = 950) = 54.93, p < .001$. In the whole sample, there were relatively low rates of medication use (4.0%) and psychiatric hospitalization (1.5%). Individuals in the mood disorders group (37%) were most likely to have sought services, whereas those within the substance disorders group (24%) were least likely.

With respect to suicidality, reports of suicide attempt were rare (2.0%), although concentrated among cases of study members identified with disorders. Disordered cases (4.1%) were more likely than nondisordered study members (0.5%) to have attempted suicide in the past year, $\chi^2(1, N = 949) = 15.06, p < .001$.

With respect to informants' descriptions, problem behaviors associated with mental disorders were reported by an informant for 37% of the disordered cases versus 23% of the nondisordered group, $\chi^2(1, N = 914) = 25.83, p < .001$. Informants were most likely to corroborate mood disorders. They were least likely to corroborate problems associated with a substance disorder or panic disorder, consistent with the relatively covert nature of the symptoms for these types of disorders.

With respect to court records, rates of criminal conviction were also higher among study members with psychiatric disorders than among members of the nondisordered group (22% vs. 8%), $\chi^2(1) = 37.44, p < .001$. Criminal conviction rates were also differentially associated with specific disorders. Consistent with the illegal nature of some of the criterion behaviors for these diagnoses, persons with antisocial personality disorder and marijuana dependence were the most likely to have records of criminal convictions. (Criminal records were not, however,

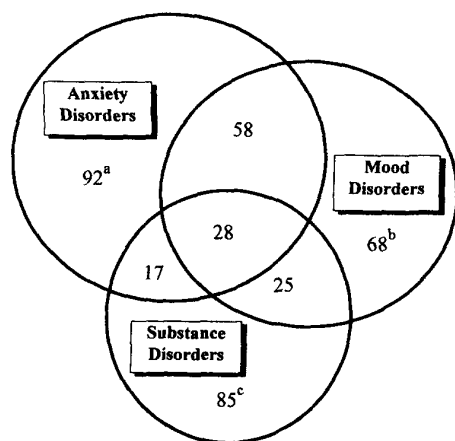


Figure 1. Comorbidity among the three most prevalent families of disorders in the Dunedin, New Zealand, sample at age 21. ^a Of these 92 anxiety cases, 8 cases also had a diagnosis of eating disorder, antisocial personality disorder, or nonaffective psychotic symptoms. ^b Of these 68 mood cases, 7 cases also had a diagnosis of eating disorder, antisocial personality disorder, or nonaffective psychotic symptoms. ^c Of these 85 substance cases, 9 cases also had a diagnosis of eating disorder, antisocial personality disorder, or nonaffective psychotic symptoms.

Table 2
Evidence of Clinically Significant Impairment for Individuals Identified With a DSM-III-R Psychiatric Disorder as the Percentage of Diagnosed Cases at Age 21

Disorder	n	% with self-reported interference	% who sought treatment	% on psychotropic medication	% hospitalized in past year	% who attempted suicide	% with informant corroboration	% with criminal conviction	% with any significant impairment
Any psychiatric disorder	389	97.9	25.1	8.1	3.1	4.1	37.3	22.4	99.0
Anxiety disorders	195	84.1	29.5	9.9	4.2	7.2	41.5	20.5	89.7
Generalized anxiety disorder	18	94.4	44.4	16.6	0.0	11.1	55.5	16.7	94.4
Obsessive-compulsive disorder	67	92.5	37.3	17.9	6.0	10.4	59.7	34.3	97.0
Panic disorder	6	100.0	33.3	0.0	0.0	0.0	16.7	16.7	100.0
Agoraphobia	36	77.8	44.4	19.4	11.1	13.8	50.0	16.7	80.6
Social phobia	92	85.9	28.3	10.8	4.3	7.6	34.9	16.3	89.1
Simple phobia	80	81.3	26.2	10.0	6.3	6.3	46.3	13.8	87.5
Mood disorders	179	97.2	36.9	13.1	5.2	4.5	44.1	16.8	98.3
Major depressive episode	161	97.5	37.3	13.0	4.3	5.0	38.5	14.9	98.1
Manic episode	19	89.5	47.4	10.5	10.5	5.3	68.4	31.6	94.7
Dysthymia	28	29.9	50.0	21.4	3.6	7.1	75.0	25.0	100.0
Eating disorders	13	100.0	46.2	23.1	15.4	23.1	46.2	7.7	100.0
Anorexia nervosa	4	100.0	50.0	25.0	25.0	25.0	25.0	25.0	100.0
Bulimia nervosa	9	100.0	44.4	22.2	11.1	22.2	55.6	0.0	100.0
Substance disorders	155	70.3	23.7	7.8	4.6	5.2	36.8	34.2	82.6
Alcohol dependence	94	72.3	28.7	7.4	5.3	5.3	34.0	24.5	81.9
Marijuana dependence	91	73.6	22.0	11.0	5.5	7.7	41.8	42.9	86.8
Antisocial personality disorder	31	—	25.8	9.7	3.2	6.4	45.2	51.6	61.3*
Nonaffective psychosis	39	76.9	38.5	10.3	0.0	5.1	53.8	35.9	89.7

Note. DSM-III-R = *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed., revised).

*The impairment scale in the last column for antisocial personality disorder is derived from only six indices in contrast to the other disorders that use seven separate indices. Persons with this diagnosis were not asked whether their symptoms interfered with work and daily activities.

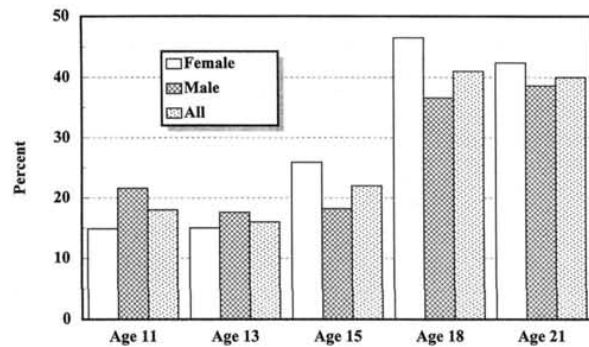


Figure 2. One-year prevalence of psychiatric disorders in Dunedin, New Zealand, birth cohort from age 11 to age 21.

used in assigning these diagnoses.) Persons with anxiety disorders were generally the least likely to have conviction records.

In light of the high rates of psychiatric comorbidity, we examined whether impairment was a function of the number of concurrent diagnoses. A scale was created by counting how many of the seven indices of impairment each study member had experienced in the past year. This impairment scale was highly and positively correlated with the absolute number of diagnoses made ($r = .61, p < .001; N = 961$). Thus, it appears that individuals with multiple disorders and omnibus symptom patterns experienced more debilitating consequences for their lives.

Prevalence of Psychiatric Disorder From Late Childhood to Adulthood

Figure 2 shows a longitudinal comparison of the rates of psychiatric disorder in the Dunedin cohort, assessed at five successive ages from 11 to 21 years. At ages 11, 13, and 15, the Dunedin study used a modified version of the DIS for Children—Child Version (DISC-C; Costello, Edelbrock, Kalas, Kessler, & Klaric, 1982) to identify symptomatology for 12 different DSM-III childhood disorders. At age 18, the DIS—DSM-III-R used was the same as that used at age 21. The specific modifications to the DISC-C and DIS for the Dunedin study and the prevalence rates found at these ages have been previously reported by Anderson et al. (1987) for the sample at age 11, by McGee et al. (1990) for age 15, and by Feehan et al. (1994) for age 18. The prevalence rates for this sample at age 13 have not been previously reported.

As shown in Figure 2, the percentage of cases with psychiatric disorder increased steadily with the age of the sample. These 1-year prevalence rates increased by twofold over the course of adolescence: from an overall rate of 18% at age 11 to the highest rate of 41% reached at age 18. The prevalence rates associated with each age wave were compared over time by assuming the presence of a disorder conformed to the normal properties of binomial distributions for large samples. By computing the 95% confidence intervals for prevalence rates at each age, nonoverlapping intervals were interpreted as significant incremental changes. Significant increases in the rates of psychiatric disorder occurred between the ages of 13 and 15 and again between the ages of 15 and 18 years.

Table 3
New Case Incidence at Age 21 for Specific DSM-III-R Disorders and Percent of Cases With Previously Identified Psychiatric Disorder as Assessed by DIS or DISC-C Interview

Disorder at Age 21	No. of cases at age 21	% of cases with previously diagnosed disorder at ages 11, 13, 15 or 18	% of cases who were new cases at age 21
Any psychiatric disorder	389	73.8	26.2
Anxiety disorders	195	80.5	19.5
Generalized anxiety disorder	18	88.9	11.1
Obsessive-compulsive disorder	67	83.6	16.4
Panic disorder	6	83.3	16.7
Agoraphobia	36	86.1	13.9
Social phobia	92	79.3	20.7
Simple phobia	80	82.5	17.5
Mood disorders	179	72.1	27.9
Major depressive episode	161	70.2	29.8
Manic episode	19	78.9	21.1
Dysthymia	28	100.0	0.0
Eating disorders	13	84.6	15.4
Anorexia nervosa	4	75.0	25.0
Bulimia nervosa	9	88.9	11.1
Substance disorders	155	78.1	21.9
Alcohol dependence	94	76.6	23.4
Marijuana dependence	91	83.5	16.5
Antisocial personality disorder	31	90.3	9.7
Nonaffective psychosis	39	87.2	12.8

Note. DSM-III-R = *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed., revised); DIS = Diagnostic Interview Schedule; DISC-C = DIS for Children—Child version.

New Case Incidence of Psychiatric Disorder in Young Adults

The final series of analyses reported here involved determining the incidence of newly diagnosed cases of mental disorders at age 21. As shown in Table 3, nearly three fourths (73.8%) of the study members with diagnoses at age 21 had been previously diagnosed during adolescence. The incidence rate of new disorders among previously undiagnosed members of the Dunedin sample was only 10.6%. In fact, only 35.6% of the cohort had escaped a lifetime diagnosis by the age of 21, providing a cumulative hazard rate of psychopathology for the Dunedin sample of 64.3%. Of those ever diagnosed, only 16.5% had their first experience of mental illness as adults (in the year before their 21st birthday). Study members who presented with major depressive episode, anorexia nervosa, and alcohol dependence were the most likely to be new cases.

The incidence of new cases is necessarily an overestimation for three design-related reasons. First, diagnostic assessments were not made before the age of 11 years, so histories of disorders in early childhood were not counted. Second, study members were counted as a past case only if diagnosed at any of the previous assessments. It was possible that some sample members were not diagnosed because they did not participate in one or more of the prospective assessments. Third, the schedule of the Dunedin assessment waves sampled the 12-month reporting periods preceding the 11th, 13th, 15th, 18th, and 21st birthdays, leaving the 12-month periods preceding the interim birthdays unmeasured. As a result of this "coarse net," some unknown portion of the cohort deemed new cases at age 21 may have experienced episodic, undiagnosed disorders in the past.

Further analyses suggested that adult-onset cases of disorder were less severely affected than their disordered counterparts who had been previously diagnosed in childhood or adolescence. New cases were less likely than cases with histories of disorder to have multiple comorbid diagnoses at age 21 (26.5% vs. 54.7%), $\chi^2(1) = 24.94, p < .001$. New cases also had fewer indices of clinical impairment than cases with histories of disorder ($M = 2.7, SD = 1.5$ vs. $M = 3.5, SD = 1.8$), $t(387) = 3.23, p < .001$.

We conducted follow-back longitudinal analyses to determine whether age-21 cases with a psychiatric disorder had a developmental history characterized by a phenotypically similar disorder (i.e., *homotypic* continuity) or by a different disorder. Figure 3 shows the types of previously diagnosed disorders as the percentage of age-21 cases for each of the three major families of disorder: mood, anxiety, and substance disorders. Individuals with an age-21 anxiety disorder were significantly more likely to have a history of anxiety disorder (61.5%) than a history of a different type of disorder (18.9%) or no previous disorder at all (19.5%), $\chi^2(2) = 138.51, p < .001$. Individuals with an age-21 mood disorder were also more likely to have a history of depressive disorder (45.3%) than a history of a different type of disorder (26.9%) or no previous disorder at all (27.9%), $\chi^2(2) = 59.84, p < .001$. We could not conduct a parallel follow-back analysis for age-21 substance disorder because developmental and nosological changes in the diagnostic systems did not provide for a diagnosis of substance disorder before the age of 18. Figure 3 does reveal, however, that age-21 substance disorder cases had polymorphous diagnostic histories, including significant numbers previously diagnosed with conduct disorders, depression, and anxiety disorders.

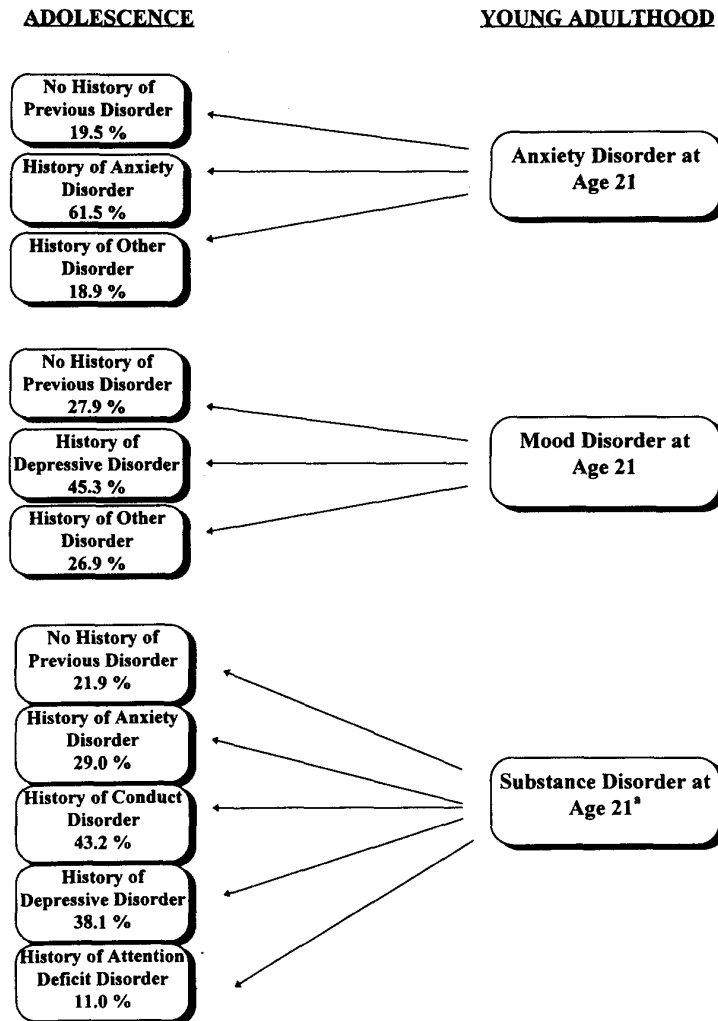


Figure 3. Adolescent diagnostic history for three major families of psychiatric disorders assessed at age 21. *For the substance disorder cases identified at age 21, follow-back diagnoses do not add up to 100% because of comorbidity among the adolescent disorders.

Discussion

Strengths and Limitations

The Institute of Medicine (1994) recently called for more research about the epidemiology of psychiatric problems in young adults, especially about the transitional period from adolescence to adulthood. The present longitudinal study sought to answer this call by providing information about the prevalence and comorbidity of mental disorders in young adulthood. By studying an unselected birth cohort this study could provide reliable information about rates of specific mental disorders occurring among 21-year-old men and women. By obtaining multiple indices of functional impairment, the present study was able to estimate the extent to which mental disorders interfere in the developmental tasks of young adulthood. By following the sample pro-

spectively with standardized diagnostic assessments at ages 11, 13, 15, 18, and 21, this study was able to provide information about longitudinal changes in rates of mental disorders and about the incidence of new cases in young adulthood.

This study was limited by omissions in assessment of the entire spectrum of possible *DSM* disorders. Because of time constraints in our assessment program and the expectation of low base rates for certain disorders, we did not assess somatoform disorders, schizophrenia, sexual disorders, and drug abuse or dependence disorders other than for alcohol and marijuana use. Similarly, with exception of antisocial personality disorder, we were not able to assess *DSM*-Axis-II personality disorders, cognitive impairments, and organic mental disorders through use of self-report in the time-limited, structured interviews. Moreover, we were not able to collect detailed clinical treatment his-

tories from individual cases. We were, thus, unable to address those questions concerning the clinical course of mental disorders; questions about patterns of remission and relapse; questions about motivation to seek out mental health services; and questions about those factors relating to treatment response. These omissions in our assessment constrain a complete knowledge of prevalence rates, comorbidity, and functional impact of mental illness among young adults.

Prevalence of Psychiatric Disorder in Young Adulthood

The present study revealed that the prevalence rates of mental disorders in young adulthood are alarmingly high. These high rates are of special concern, as the data suggest those cases identified by a diagnosis are not trivially afflicted, but are indeed functioning more poorly than their nondisordered peers. Young adults with psychiatric problems experience numerous obstacles in their development: According to self-reports, they experience interference in their work and daily activities; according to informant reports, they have developed a reputation for disturbed behavior; and according to official records, they have a higher incidence of criminal conviction than psychiatrically healthy young adults. These obstacles may impede young adults in their efforts to complete their education, secure employment, and form satisfactory relationships.

The 12-month prevalence rate of any psychiatric disorder among 21-year-olds in the Dunedin study was 40.4%. In comparison, in the United States the 12-month rate among 18- to 29-year-olds in the ECA study was approximately 25% (Robins & Regier, 1991) and among 15- to 24-year-olds in the NCS study, the 12-month rate was approximately 37% (Kessler et al., 1994). Although the rates for specific disorders vary across countries, it appears that 25% to 40% of young adults in industrial countries suffer from a mental disorder.

The ratio of men and women afflicted with specific disorders is very consistent across studies. As shown in this analysis and by others (e.g., Kessler et al., 1994; Robins & Regier, 1991), women were more likely to be diagnosed with anxiety and depressive disorders, and men were more likely to be diagnosed with substance disorders and antisocial personality disorder. It may be that biological or cultural universals serve to constrain aspects of mental disorders in populations (such as the relative risk of men to women who are afflicted by specific symptoms), whereas structural factors (such as the availability of drugs of abuse) shape the manifestation of disorders within communities.

Comorbidity of Psychiatric Disorders

Another remarkable consistency between the present study and other recent epidemiological surveys is the extent of comorbidity among mental disorders. The present study and others (e.g., Kessler et al., 1994; Robins & Regier, 1991) have indicated that nearly half of diagnosed cases have more than one concurrent disorder. These high rates of comorbidity have important implications for intervention. In this study, the comorbid cases suffered significantly more functional impairment than the single-disorder cases. There was a strong linear rela-

tionship ($r = .61$) between the number of co-occurring disorders and the level of impairment.

Analyses of specific patterns of comorbidity revealed high overlap between anxiety, mood, and substance disorders among young adults. The high level of comorbidity raises issues about taxonomy, suggesting, for example, a discrete syndrome involving mixed features of anxiety and depression (Kendler, Neale, Kessler, Heath, & Eaves, 1992). Comorbidity is also problematic from the perspective of research and treatment. For example, from our results, it appears that many young people who are dependent on drugs need treatment for depression and that many depressed young people need treatment for substance dependence. Findings such as these suggest a need to reconsider current institutional practices that separate chemical dependency research and services from mental health research and services.

Longitudinal Change From Late Childhood to Young Adulthood

This study is the first to use a longitudinal-epidemiological design to document age-related changes in the prevalence of mental disorders from late childhood to young adulthood. Longitudinal-epidemiological studies provide critical information about when in the course of development particular behaviors increase and decrease and about when associations between variables change (Rutter, 1988). Our findings showed that the rates of mental disorder steadily increased from late childhood through mid- to late adolescence and reached an apparent asymptote in young adulthood. At age 11, 18% of the study members were diagnosed with mental disorders; by age 21, twice as many study members (40.4%) were so diagnosed. The deceleration of this trend between ages 18 and 21 raises a question about what direction this trend will take in later phases of adulthood.

Incidence of New Cases

Although the rate of mental disorders in young adulthood is very high, the majority of young adults diagnosed at age 21 had a developmental history of mental illness. Three fourths of diagnosed cases at age 21 had histories of childhood or adolescent problems that met criteria for *DSM* disorders. Only a fraction (16.5%) of those cases ever diagnosed had their first experience of mental illness as adults. Note, however, that the longitudinal-developmental information at our disposal is incomplete. We did not assess disorders before age 10, and we assessed 12-month disorders only at ages 11, 13, 15, and 18. Therefore, the reported incidence rate at age 21 (10.6%) likely overestimates the numbers of new cases. It appears that the vast majority of young adults with mental illness have had long-standing psychological problems.

These findings suggest that most mental disorders tend to be chronic or, at best, episodically remitting. It appears that most cases of young adult mental disorder have a prodromal phase in childhood or adolescence, and the period of risk for onset of mental disorder is before the age of 18. It is possible that developmental and environmental challenges encountered during the transition from adolescence to adulthood represent proxi-

mal causes of mental illness, but the high rates of past disorder among young adult cases point to powerful distal causes: to pre-existing diatheses earlier in the life course. This interpretation is confirmed by our follow-back analyses of age-21 disorders that underscored continuities in the characteristic manifestation of psychiatric disturbances from late childhood and adolescence. We found considerable homotypic continuity in young adults for anxiety and mood disorders as well as varied earlier manifestations of psychiatric symptomatology among young adult substance dependence cases.

Implications for Intervention

Longitudinal-epidemiological studies of mental health may guide policy making and inform interventions by providing information about continuity and change in the occurrence and developmental course of mental disorders in the general population. Interventions need to be consistent with relevant epidemiological facts. Efforts to educate the community need to communicate the widespread nature of mental illness, not its rarity. Indeed, our results show that by age 21, only about 36% of the cohort had escaped diagnosis with a major mental disorder. Treatment resources clearly need to focus on the younger sector of the population. Longitudinal results also indicate that, although the prevalence of mental disorders peaks in young adulthood, most patients who will present for treatment are cases with long-standing histories of childhood psychiatric problems. Thus, primary prevention efforts must target the population during the age of onset in childhood and adolescence, not in young adulthood when prevalence is highest but the incidence of new cases is low.

In addition, results from the current study suggest that secondary and tertiary prevention efforts need to attend to the implications of high rates of comorbid cases. These cases are associated with greater impairment and longer duration of illness. Such cases are likely to be more impaired and require more comprehensive diagnostic assessment and intervention services. The best candidates for brief focal interventions may be the relatively small percentage of cases who are diagnostically "pure" rather than comorbid, and who have an adult onset of illness without childhood histories of disorder.

Despite high rates of mental health problems in young adulthood—problems that, more often than not, appear to be long-standing and interfere with life functioning—young adults have notably low rates of treatment seeking for mental health concerns. Although New Zealand's socialized health care system offered services at no cost to the patient, we found that only one in four diagnosed cases had sought professional treatment for their psychiatric symptoms. These rates of treatment seeking are similar to rates from epidemiological studies conducted in other countries, where economic barriers are thought to impede access to health care. It is of concern, even with widely available services, that more do not seek help. Above all, our results indicate a need for approaches to preventing mental disorder that integrate epidemiological research with research on intervention and service delivery (Institute of Medicine, 1994).

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