

DSM-III-R disorders in New Zealand 18-year-olds

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The one-year prevalence and correlates of selected DSM-III-R disorders were determined in a sample of 930 18-year-olds. Using both diagnostic and impairment criteria 340 individuals (36.6%) were considered to have disorder. The most prevalent disorders were major depressive episode (16.7%), alcohol dependence (10.4%) and social phobia (11.1%). There was a high degree of co-morbidity among disorders; 46% of those with disorder had two or more. The prevalence of disorders was greater for females, with the exception of conduct disorder and alcohol or marijuana dependence. A variety of characteristics were associated with disorder, including poor social competence, disadvantage and self-rated health status. A third of those with disorder had their problems recognised by a "significant-other". The results are presented within the context of a perceived need for research in the area of adolescent and early adult mental health in order to minimise the toll of mental disorder in later life.

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Little information is available about the extent and nature of mental ill-health in New Zealand. This is particularly evident for late adolescence and early adulthood, the developmental period in which many mental health disorders of adulthood are acquired. Recent studies using recognised criteria (such as

DSM-III or III-R) in other countries have tended to focus on particular areas such as the eating disorders [1] and personality [2], and have utilised small samples, very often of clinical or special groups (for example, dancers [3]; homicidal youths [4]). Larger studies with samples representative of the general population are uncommon, and tend to use very wide age ranges with proportionally smaller numbers of adolescents, or are restricted to adults only. Information about adolescent and early adult disorder can be gleaned by asking "age-of-onset" questions, a problematic approach given difficulties with recall accuracy and bias. Nevertheless, a recent review of the United States Epidemiologic Catchment Area (ECA) study of adults (aged 18 years or older) reported that the median age for the onset of disorder was 16 years, and 75% had experienced symptoms by the age of 24 [5].

In Australia, a National Mental Health Strategy has been adopted in an attempt to reform mental health services. However, a recognition of the importance of

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information about the mental health of children and adolescents is not evident in the national strategy. Kosky and Hardy concluded that there must be a "significant shift of resources to child and adolescent mental health services if we are to attempt to lessen the long-term distress and disability caused by mental illness" [6].

In New Zealand the principal source of information regarding the mental health of the population is the Department of Health's Mental Health Register. This is limited in that it contains only in-patient data from psychiatric hospitals and other licensed institutions. It does not contain data about non-residential treatment provided by state controlled or private agencies. By examining admission rates by age, basic descriptive information can be obtained about the range of psychiatric disorder requiring hospital treatment in the late-adolescent or early adult age-group. According to the *Health Department report for 1988* [7], the overall admission rate for the 15-19 age group was 197 per 100,000 population (210 for males and 183 for females). There were clear differences between the sexes in the diagnoses made at first admission. In the male 15-19 age group the disorder with the highest first admission rates was drug dependence and abuse, followed by alcohol dependence and abuse. The rate for neurotic and other depressive disorders for males was approximately half the rate for females. For females the rate of first admission for drug dependence and abuse was lower than that for males, but still high, whereas the rate for alcohol dependence or abuse was considerably lower. The sex differences in the diagnoses made at first admission in this age group are similar to those in older age groups. Over all age groups, the highest admission rates for males were for alcohol dependence or abuse, and for women, depressive disorders.

Only one recent New Zealand study has described the prevalence of psychiatric disorders among adults [8,9]. The Christchurch Psychiatric Epidemiology Study (CPES) conducted diagnostic interviews with a probability sample of 1498 adults aged 18 to 64 years. Diagnostic classifications were made using DSM-III. The findings were in general accord with the Mental Health Register admissions data. Men were more likely than women to have substance abuse disorders and women were more likely to have affective and anxiety disorders. However, the admission rates may markedly underestimate the prevalence of disorder in the community. The highest lifetime prevalence estimates

from the CPES were for generalised anxiety (31%), alcohol abuse or dependence (19%) and major depressive episode (13%) [8]. The comparable one-year prevalence estimates were 13%, 9% and 7% respectively [9]. For each major age group only the six-month prevalence rates were reported. The 18-24 year-olds had the highest six-month prevalence rates of disorder of 29%. The authors concluded that the higher prevalence rate in this age group was due to the high rates of substance use disorder, in particular alcohol abuse or dependence. However, the small number of individuals in the youngest age group in the CPES (71 males and 187 females) did not allow for a detailed consideration of disorder in the late-adolescent to early adult period.

The Dunedin Multidisciplinary Health and Development Study (DMHDS) is a longitudinal investigation of a large sample of New Zealand children followed from birth. The overall aim has been to study the cohort's health, development and behaviour and to identify the correlates of normal and abnormal development [10]. One aspect of this study has been the investigation of mental health disorder in the pre-adolescent [11,12] and adolescent years [13]. This paper describes the latest assessment of the DMHDS sample at age 18 years and reports prevalence estimates for the major mental health disorders found in this age group. In addition to describing the disorders and their degree of co-morbidity, this paper examines a range of mental health related and background variables in order to determine the strength of their association with disorder.

Method

Sample

The sample was recruited from a cohort of children born at Dunedin's Queen Mary Hospital (the principal obstetric service for the Dunedin region) between April 1, 1972 and March 31, 1973. Of the 1139 children eligible for assessment at age 3, 34 were traced too late for inclusion and the parents of 68 declined participation. The remaining 1,037 formed the sample for the longitudinal assessments. Attrition since then has been low and excellent follow-up rates have been maintained. On a six-level index of socioeconomic status (SES) developed for New Zealand [14], the sample was somewhat socioeconomically advantaged relative to the country as a whole, and was

under-representative of Maori and other Polynesian children at age 3: 3% compared with 12% for the country as a whole [10]. At the age 18 assessment, when those whose data were included in the present paper were asked to indicate their ethnic origin, the majority (93%) identified themselves as "European", 3% as "New Zealand Maori", and 4% identified with "other" racial groups.

Procedures

The assessment at age 18 was similar to those at earlier phases of the study. A description of the procedures along with a consent form was mailed to each member of the sample, inviting them to attend the Dunedin Unit for a full day of assessments as close as possible to their 18th birthdays. Some 71% of the sample were still resident in Dunedin. The remainder were spread throughout New Zealand and overseas (51 were resident in Australia and 6 lived in the Northern hemisphere). Transport was provided for those living outside Dunedin to attend the Unit. Those unable to attend the Unit (including those in Australia) were interviewed in their own home or where convenient. The interviews which provided the information for the present report were: a mental health interview which included the assessment of psychopathology; an interview which assessed personality and illegal or antisocial behaviours; and a demographic interview which included questions pertaining to background characteristics, occupational activities and educational attainment. All the mental health interviewers had postgraduate qualifications in psychology. Procedures for possible referral to professional services were arranged prior to the commencement of assessments.

The age 18 assessment ran from April 1 1990 to June 31 1991, and 988 sample members provided information about themselves. Ten sample members had died, five had severe intellectual disabilities, four could not be traced and thirty declined or were unable to participate (for example, they were overseas). Complete mental health data were available for 930 individuals (454 female, 476 male). This represented 91% of those surviving to age 18 (1,027), or 90% of those assessed at age 3.

Despite efforts to assess each individual as close as possible to their 18th birthday, some were seen earlier and some later. The age at assessment ranged from 17 to 19 years with a mean of 18 years 2 months. The

majority of the sample (77%) were assessed in the three months immediately before or after their birthday. Nine sample members were assessed earlier than three months before their birthday, whereas 212 were seen more than three months after. This included 113 who were assessed more than 6 months after their birthday. No significant sex difference was evident between these groups ($p > 0.05$).

Measures

Diagnostic interview

The diagnostic interview was made up largely of items from the latest version of the "Diagnostic Interview Schedule" (version III-R [15]) developed by the National Institutes of Mental Health (NIMH) for the ECA program [16,17,18]. The DIS was originally designed for adult respondents aged 18 years or over, but it has been used successfully with older adolescents [19].

Items were modified to meet the particular requirements of the study but as far as possible the wording of actual questions was retained. The major alterations were to use only those items which gave DSM-III-R classifications and to rephrase lifetime prevalence questions in order to give a one-year prevalence estimate. This largely involved replacing "ever" with the phrase "in the last year".

Given the time constraints on the interview (a maximum of 50 minutes) most sections were "gated" on the principal symptoms of the disorder. Items were scored as at age 15, 0 - "no", 1 - "sometimes" and 2 - "yes, definitely." In identifying disorder, only scores of "2" were used to indicate a positive response, (commensurate with a "5" in the original DIS). Additional changes to questions were also necessary to take account of current New Zealand and United States differences in idiom. To provide variety and shorten administration time, certain symptom lists were shown on cards rather than administered orally.

In order to minimise undue repetition, questions relating to conduct disorder were not asked in the mental health interview. Rather, symptoms of this disorder were assessed with a subset of items from the "Denver Youth Survey Youth Interview Schedule" [20] included in the illegal behaviour interview developed by Dr T. E. Moffitt (University of Wisconsin-Madison). This instrument recorded the frequency of each behaviour exhibited in the previous year. To

convert the frequencies to an item score comparable with those used for the identification of disorder in the mental health interview, each behaviour was generally scored "0" if absent, "1" if the frequency was once in the last year, and "2" if done two or more times. The exception to this scoring was for the comparatively less frequent items pertaining to violence with the intention of severely hurting the victim (score "2" if exhibited even once).

The assessment protocols are available from the authors on request.

Impairment, help-seeking and police contact

If members of the sample reported symptoms in any of the major sections of the diagnostic interview, they were asked to indicate on a 5 point scale the degree to which those symptoms "... interfered with your life or everyday activities". The anchor points were "1- very little" and "5- very much". This scale was not included in the illegal behaviour interview. Help-seeking behaviour at age 18 was assessed by questions taken from the Health Services Utilization questionnaire modified for use in the CPES [8, 21]. The members of the sample were asked if they had sought help from a health or other professional agency in the last year in response to mental health or emotional problems. Police contact in direct relation to the respondent's behaviour was assessed within the illegal behaviour interview with the item: "How many times in the last year have you been in trouble with the police for an offence?"

Identification of mental health disorder

Bird *et al* [22] have suggested that estimates of the prevalence of disorder are more meaningful when they are related to "severity, to need for services, and to personal distress." To be considered as having a disorder in the present study, the sample member had to have (1) met the requisite symptoms according to the DSM-III-R criteria, and (2) those symptoms had to be associated with at least some disturbance in life functioning (as indicated by interference with daily functioning, help-seeking or police contact). Classification of anxious, depressive and substance dependence disorders could be made if there was some impairment of functioning (a rating of 2 or more) on the relevant scale for those symptoms. Also, identification of any disorder could be made if the sample

member had the requisite symptoms and had sought help from a health professional or other agency. The classification of conduct disorder was made if the individual had the symptoms of that disorder and had either sought help or had police contact in the previous year.

The disorders identified at age 18 were: generalised anxiety; panic; agoraphobia; simple and social phobias; obsessive compulsive disorder; alcohol and marijuana dependence; dysthymia and major depressive episode (MDE), current and in the past year; conduct disorders; and eating disorders. Results for dysfunctional eating behaviour and the residual symptoms of separation anxiety and attention deficit-disorder will be determined using data from earlier assessments, and will be reported at a later date.

Associated characteristics

Disadvantage

Given the often complex living arrangements, employment status and financial situations of the sample members at age 18 it was not meaningful to create an index of socio-economic status for individuals *per se*. Rather, a composite index of disadvantage was developed that incorporated employment status, education, financial security and dependency. A 5-point disadvantage index was made up of the following variables each scored as "1" if present: leaving school with no formal qualifications (n = 92, 38 female, 54 male); leaving school with less than 3 years secondary schooling (n = 92, 42 female, 50 male); self-perceived difficulty in supporting themselves financially (n = 95, 49 female, 46 male); the sample member or their partner having (or expecting) a dependent child (n = 30, 14 female, 16 male); and being "unemployed" (n = 159, 73 female, 86 male). The unemployed group was made up of those who reported themselves as not working, in (or about to begin) job creation schemes, doing voluntary work, doing home duties, or were otherwise unable to work (for example, they were in prison or were sickness beneficiaries). In the sample of 930, 642 reported no disadvantage, 177 a disadvantage score of "1", 60 of "2", 36 of "3", 12 of "4" and 3 a score of "5". For the purposes of this paper, those with a score of two or more were considered "disadvantaged".

Social competence

An index of social competence was devised from a series of questions assessing physical activity, attachment (to peers, parents, education or work), social support and self-perceived strengths [23]. This was comparable to the index developed at age 15 [13, 24]. The distribution of scores on the social competence index ranged from 1 to 12 with a mean of 7.5 and a standard deviation of 1.86. A cutoff of 6 and below was used to identify those with relatively "poor" social competence (26%).

Self perceived physical health status

During the mental health interview, sample members were asked to rate their overall health on a scale of "4 - very good", "3 - good", "2 - not too good" and "1 - poor." Those who rated their health as "not too good" or "poor" were considered to have "poor health."

Self-medication

Each member of the sample was asked if they had "felt so bad" (in the last year) that they had taken medication, drugs or alcohol with the express purpose "to make you feel better." This question was not used in the classification of either substance dependence or depression. A total of 122 sample members initially responded in the affirmative. Of these, 11 were taking medication prescribed by either a GP or Psychiatrist and were not considered to be "self-medicating".

Suicidal ideation

Questions pertaining to suicidal thoughts and attempts were asked at two points in the diagnostic interview. First, suicidal ideation was assessed in the section relating to major depressive episodes, and followed an initial gating question for depressed mood. The questions were later asked of all those respondents who had not been given them in the depression section.

Significant other report

Permission was obtained from each sample member at the close of the mental health interview to mail a questionnaire to a self-nominated "significant-other."

No direction was given to as to who might be a suitable respondent. The questionnaire included a problem behaviour section made up of 12 items which described behaviours from the major disorder sections of the mental health interview. These items were phrased in a general fashion, such as "doing things against the law such as stealing or vandalism" and "talking about death or dying, or of being better off dead." The respondent was asked to indicate if the member of the sample had shown the behaviour described by the statement in the previous twelve months, coded as "no, doesn't apply", "yes, applies somewhat" and "yes, certainly applies."

For the 930 with complete mental health data, 830 (89%) had significant-other data. The majority of questionnaires were completed by female respondents (73%); 50% were completed by a parent and 30% by a close friend. The remaining respondents were spread between a sibling (5%), other relative (2%), spouse or partner (8%), and "other" (5%).

Interviewer reliability and agreement

To assess the reliability of the diagnostic section of the interview, 50 retest interviews were conducted prior to ($n = 16$) and during ($n = 34$) the age 18 assessment. The illegal behaviour questions were only re-administered to the 34 in the main study. The mean interval between interviews was approximately two months (mean 60.1 days). Given the low prevalence rates of certain disorders it was not meaningful to measure test-retest agreement for individual disorders; rather, agreement was calculated for three collective disorder groups: anxiety disorders, depressive disorders and substance dependence disorders. The low number who completed the retest interview for conduct disorder (34) precluded calculation of a kappa statistic for that disorder. Kappa has been suggested to be the most appropriate statistic for calculating the reliability of interview administration [25].

A kappa of 0.49 was obtained for the anxiety disorders, 0.73 for the depressive disorders and 0.88 for the substance dependence disorders. According to Landis and Koch [26] these observed agreements would fall in the "moderate", "substantial" and "almost perfect" ranges respectively. As guidelines such as these are somewhat arbitrary, the theoretical maximum kappas given the observed data were also calculated [27]. These were 0.90, 0.86 and 0.88 respectively. This gives a proportion agreement (observed

Table 1. The one-year prevalence of individual disorders as a percentage of the sample (n = 930). Prevalence figures are adjusted for impairment in life-functioning, help-seeking, or police contact

Disorder	n with disorder	F	M	F:M	Prevalence* %	
Generalised anxiety	17	12	5	2.4:1	1.8	(1.1,2.9)
Panic disorder	7	5	2	2.5:1	0.8	(0.3,1.7)
Agoraphobia	37	26	11	2.4:1	4.0	(2.8,5.5)
Social phobia	103	67	36	1.9:1	11.1	(9.1,13.5)
Simple phobia	57	40	17	2.4:1	6.1	(4.6,7.9)
Obsessive compulsive disorder	37	22	15	1.5:1	4.0	(2.8,5.5)
Alcohol dependence	97	39	58	0.7:1	10.4	(8.4,12.7)
Marijuana dependence	48	18	30	0.6:1	5.2	(3.8,6.9)
MDE** - current	32	18	14	1.3:1	3.4	(2.3,4.8)
MDE - past	124	81	43	1.9:1	13.3	(11.1,15.9)
Dysthymia	30	21	9	2.3:1	3.2	(2.2,4.6)
Conduct disorder	51	10	41	0.2:1	5.5	(4.1,7.2)

* Prevalence figures are presented with approximate upper and lower 95% confidence interval limits [38]
 ** MDE: Major Depressive Episode

kappa/theoretical maximum) of 0.54 for the anxiety disorders, 0.84 for the depressive disorders and 1.0 for the substance dependence disorders. In addition, intra-class correlations were calculated for "symptom scores", based on the sum of the item scores for the domains of anxiety, depression, substance dependence and conduct disorder. This is considered to be a desirable indication of agreement between ratings of quantitative data [28]. The intra-class correlation between conduct disorder scores at time 1 and time 2 was 0.35 ($p < 0.01$). While significant, this was less than the correlations obtained for anxiety scores (0.81, $p < 0.001$), substance dependence (0.80, $p < 0.001$) and depression scores (0.78, $p < 0.001$). A paired t-test was carried out for each scale in order to test for the presence of the "re-test artifact," a sometimes reported

decline in the mean scores for certain scores on retest [29]. For each of the scales the difference in mean scores was not statistically significant ($p > 0.05$).

Results

Prevalence of disorder

A total of 416 individuals or 44.7% of the sample initially met the requisite DSM-III-R criteria for disorder in the last year. When the life-functioning criteria (impairment in daily functioning, help-seeking or police contact) were applied, 340 or 36.6% of the sample were classified as having at least one of the 11 principal disorders. The association between sex and the presence of disorder was significant ($\chi^2 = 12.1$, 1 df, $p < 0.001$); of the 454 females, 192 (42.3%) had disorder compared with 148 (31.1%) of the 476 males. Table 1 contains the prevalence figures for each disorder.

The most prevalent disorders were the anxiety disorders (258 instances), followed by affective disorders (186), substance dependence disorders (145) and conduct disorder (51). The quality of the sample members' relationships with peers and parents was most commonly reported as the principal source of anxiety. This was reflected in the relatively high prevalence of social phobia and the disclosed "reasons for feeling anxious" for those with generalised anxiety: of the 17 individuals with the simple phobia, 15 cited relationship difficulties as being a source of anxiety. This compared with work related difficulties ($n = 6$), health or pregnancy ($n = 5$) and money ($n = 3$). A similar pattern of difficulties was evident among those with current MDE. Of those who disclosed a possible reason for their feelings of depression ($n = 24$), ten reported relationship difficulties or breakdowns. This compared with four reports of difficulties in family relationships, five reports of difficulties at work, and two reports of depression associated with pregnancy.

The most prevalent individual disorders were past MDE (13.3%), alcohol dependence (10.4%) and social phobia (11.1%). The next most frequent disorders were simple phobia (6.1%), conduct disorder (5.5%), and marijuana dependence (5.2%). The remaining disorders were all reported by fewer than 5% of the sample; in decreasing frequency these were obsessive compulsive disorder and agoraphobia, dysthymia, generalised anxiety and panic disorder. The prevalence of MDE (16.7%; 95 CI - 14.3, 19.7) is

Table 2. The prevalence and sex differences for each associated characteristic

	Total n=930 %	Female n=454 %	Male n=476 %	χ^2 (df=1)
Older than 18y 3m	22.6	22.3	22.9	<1.0 ns
Disadvantaged	12.2	10.8	13.0	<1.0 ns
Poor social competence	26.2	22.5	29.8	6.5 *
Poor self-rated health	8.9	12.1	5.9	10.4 **
Suicidal ideation	10.4	13.9	7.1	11.3 ***
Self-medicating	11.9	11.0	12.8	<1.0 ns

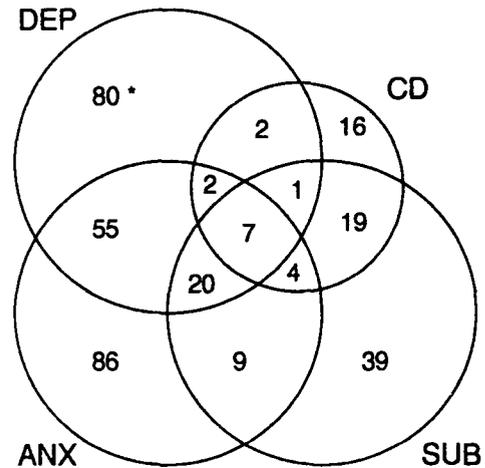
ns p>0.05
** p<0.01
* p<0.05
*** p<0.001

presented according to "current" and "past" episodes of the disorder in the previous 12 months. In this table the "current" category included three individuals who were currently depressed and who also reported at least one other past episode in the year.

A series of post-hoc chi-square tests were conducted, comparing the sex distribution of each disorder with the sex distribution of those reporting no disorder (44.4% female, 55.6% male). Given the small n for some of these comparisons, conclusions should be made cautiously. Nevertheless, it appeared that those with agoraphobia ($\chi^2 = 8.4$, 1 df, $p < 0.01$), social phobia ($\chi^2 = 14.2$, 1 df, $p < 0.001$), simple phobia ($\chi^2 = 12.9$, 1 df, $p < 0.001$), MDE-past ($\chi^2 = 17.2$, 1 df, $p < 0.001$) and dysthymia ($\chi^2 = 6.5$, 1 df, $p < 0.05$) were more likely to be female. Those with conduct disorder were more likely to be male ($\chi^2 = 12.1$, 1 df, $p < 0.001$). However, the associations between disorder and sex were not significantly different for the remaining disorders ($p > 0.05$ in each analysis). For those disorders, significant sex differences might have been expected (more women with MDE - current, and more men with alcohol and marijuana dependence).

Co-morbidity of disorder

There was a high degree of co-morbidity among disorders. Of the 340 with disorder 54% had one, 23% had two and the remaining 23% had three or more disorders. One male had eight disorders. Females were



* 14 cases were also substance dependent

Figure 1. Overlap between the four major disorder domains at age 18: DEP - depressive disorders; CD - conduct disorder; SUB - substance dependence (alcohol or marijuana); and ANX - anxiety disorders.

Total n = 340

more likely than males to have either a single or multiple disorders ($\chi^2 = 14.9$, 3 df, $p < 0.001$).

There was extensive overlap between the domains of depression, anxiety, substance dependence and conduct disorder. Of the 340, 133 had disorders from two or more domains. These represented 14.3% of the sample or 39.1% of those with a disorder. In this comparison no distinction is made according to the number of disorders within each disorder type. For example, those with MDE only or MDE and dysthymia would both be considered to have "depression." Seven individuals had at least one disorder from each of the four disorder domains.

There was also considerable overlap within disorder domains. For example, two thirds of those with dysthymia also had MDE ($n = 19$): 5 met criteria for dysthymia and current MDE, and 14 reported past episodes of MDE. Just over 3% of the sample (32 individuals) had both alcohol and marijuana dependence. Two thirds (67%) of those with marijuana dependence were also alcohol dependent. Similarly, within the anxiety disorder domain there was a relatively high degree of co-morbidity, with 4% of the sample having two or more types of anxiety disorder (the types being: generalised anxiety and/or panic

Table 3. The proportion of each disorder group (internalising, externalising, or mixed) with each associated characteristic compared with the proportion in the remainder of the sample

	ND* n=590 %	INT n=207 %	EXT n=74 %	MIX n=59 %	χ^2 (df=3)
Older than 18y 3m	18.6	25.6	40.5**	28.8	21.3 ***
Disadvantaged	7.6	9.7	39.2**	32.2**	79.7 ***
Poor social competence	21.2	27.1	44.6**	50.9**	39.2 ***
Poor self-rated health	5.3	14.0**	10.8	25.4**	36.5 ***
Self-medicating	4.2	14.0**	32.4**	55.9**	172.3***
Suicidal ideation:					
Female	6.1	24.5**	6.3	33.3**	37.9 ***
Male	2.1	15.6**	10.3**	42.3**	68.7 ***

* ND - no disorder, INT - internalising disorder, EXT - externalising disorder, MIX - mixed disorder, internalising and externalising
 ** Post hoc comparison with the ND group significant ($p < 0.05$) [39]
 *** Overall χ^2 significant, $p < 0.001$

disorder; any of the three phobias; and obsessive compulsive disorder).

Associated characteristics of disorder

In order to examine the correlates of disorder, the disorder domains illustrated in Figure 1 were used to define three groups, designated as "internalising", "externalising" and "mixed" disorder. The internalising disorder group was made up of sample members with disorders from the depression and/or anxiety domains ($n = 207$). Likewise, the externalising group comprised those with disorders from the conduct and/or substance domains ($n = 74$). The mixed group contained those with disorders of both internalising and externalising types ($n = 59$). There were significant sex differences when the groups were compared with the sample remainder ($\chi^2 = 61.7$, 3 df, $p < 0.001$). Of the sample remainder ($n = 590$), 44% were female compared with 69% of the internalising group, 22% of the externalising group and 56% of the mixed group.

The prevalences of these characteristics together with sex differences are presented in Table 2. The female members of the sample were more likely to report suicidal ideation and poorer health, whereas the males were more likely to report poorer social competence.

Table 3 presents the percentage of each disorder group showing the associated characteristic. Logistic regression models were used to test for an interaction effect between sex, the associated characteristic and disorder. With the exception of suicidal ideation, none of the interaction effects for sex were statistically significant.

All characteristics examined were strongly associated with disorder. The significant result for age at assessment was due to the association with externalising disorder, principally conduct disorder as opposed to substance dependence (63% of those with conduct disorder were in the older age group). A similar pattern of association was found for disadvantage and poor social competence. The proportion with each of these characteristics was significantly greater in the externalising disorder and mixed disorder groups. Again, the association appeared to be stronger in the case of conduct disorder than in substance dependence.

On the other hand, the significant result for poor health was due to an association with mixed disorder and internalising disorder, rather than externalising disorder. Those with internalising disorder were three times more likely to rate their health as poor than those without disorder.

Self-medication was strongly associated with all types of disorder. Within the internalising disorder group self-medication was more strongly associated with depression than with anxiety. Within the externalising group, self-medication was associated with both conduct disorder and substance dependence.

Approximately a quarter of those with internalising disorder and 40% of those with mixed disorder had considered committing suicide. This compared with only 4% of those without disorder. As suicidal ideation was one of the criterion symptoms for MDE, this significant association was not surprising. However, it should be noted that among those with internalising disorders there was some association between anxiety and suicidal thought. Of those with anxiety disorders who did not meet criteria for depression, 14% reported thinking of suicide. This contrasted with 18% of those

Table 4. The proportion of each disorder domain recognised by a significant other (total n = 290)

	Disorder domains *				
	DEP	CD	SUB	ANX	MULT
Number with disorder	62	8	30	82	108
Number recognised	18 (29%)	2 (25%)	17 (57%)	12 (15%)	34 (32%)

* DEP - depressive disorders; CD - conduct disorder; SUB - substance dependence disorders; ANX - anxiety disorders; and MULT - multiple domains (two or more)

with depression only and 31% of those with depression and anxiety disorders.

The association between disorder and suicidal ideation was found to be stronger for males than females. Of note, post hoc tests for males showed that the association between disorder and suicidal ideation was significant for all disorder groups. The proportion of the externalising group reporting suicidal ideation was 10%, less than in the internalising (16%) and mixed disorder groups (42%) but still significantly greater than the proportion among those without disorder (2%).

Recognition of disorder by a "significant other"

The proportion of males and females with completed significant-other questionnaires was equal. However, females were more likely than males to have the questionnaire completed by female respondents: 80% compared with 67% ($\chi^2 = 17.5$, 1 df, $p < 0.001$).

Two procedures were used to assess whether the sample member's problem behaviour was recognised by their nominated significant other. First, each disorder was considered to have been recognised if there was a one-to-one correspondence between the disorder and the general item for that disorder (scored 2 - "yes, certainly applies"). Thus any anxiety disorder was recognised by "problems with fears or worries." MDE and dysthymia were recognised by the item "feeling depressed, miserable, sad or unhappy", alcohol dependence by "problems relating to the use of

alcohol", and marijuana dependence by "problems relating to the use of marijuana or other drugs." Conduct disorder was recognised by a positive response to either "problems with aggression, such as fighting or controlling anger" or "doing things against the law, such as stealing or vandalism."

Second, two scales were created from the significant other questionnaire, using the total sum of the six internalising items each scored as 0, 1 or 2 (mean = 2.0, standard deviation = 2.0) and the sum of the five externalising items (mean = 1.2, standard deviation = 1.6). As a significant sex difference was found for each scale, separate cutoffs for each sex were used to indicate high levels of problem behaviour. In addition to the one-to-one correspondence outlined above, internalising disorders were considered recognised if the respondent's total score for internalising items was above the 1.5 standard deviation cutoff. The same approach was used for externalising disorder.

Of the 830 with self-report and significant other data, 290 (34.9%) had a self-reported disorder. Of these 290, approximately one in three were recognised as having disorder by their nominated other (83 or 28.6%). The sex difference between those with disorder recognised and those without was not significant ($\chi^2 < 1.0$, 1 df, $p > 0.05$). Five disorder groups were determined (see Figure 1): those with a disorder or disorders within any one of the four disorder domains, and those with disorders from at least two domains.

Table 4 shows the percentage of each group recognised as having a disorder by the significant other. Over half of those with a substance disorder were recognised. Around a third of those with disorders from multiple domains, the depression only domain and the conduct disorder only domain were recognised. Disorders from the anxiety only domain were those recognised least often.

Discussion

This paper reports the prevalence of DSM-III-R disorders in a cohort of 18-year-olds. Based on the self-report of symptoms, nearly half of the sample met DSM-III-R criteria for disorder. When symptoms were associated with at least some degree of impairment in daily functioning, or help-seeking or police contact, almost four of every ten members of the sample were considered to have "disorder", with a female:male ratio of 1.3:1. Overall, the most prevalent disorders were MDE, social phobia and alcohol de-

pendence. For males the most frequent disorders were alcohol dependence, MDE, conduct disorder and social phobia. Among the females the most common disorders were MDE, social and simple phobias, and alcohol dependence. For both males and females the prevalence of past episodes of MDE was high but the rate among females was twice that among males. The finding that depressive disorders and alcohol dependence were the more common disorders for both males and females (albeit in different proportions) is in accord with the major hospitalisation admissions for the 18-24 age group in the Mental Health Register. Direct comparisons with the CPES study are difficult, given that the DSM-III-R system was used in the present study whereas the CPES used the earlier DSM-III criteria. Also, the one-year prevalence figures reported by the CPES are for all age groups combined [9], and for the closest age group (18-24) only the six-month prevalence estimates were provided [8]. The overall finding from the CPES that "men clearly predominate in substance abuse disorders whereas women predominate in most anxiety and affective disorders" [8] was not completely reproduced in the present results. Although true for the affective disorders, in the 18-year-old Dunedin sample the prevalence of alcohol and marijuana dependence among females was high and not significantly different from that found among males.

While the overall high rate of anxiety disorders in both studies supported the CPES contention that "anxiety symptoms and disorders are extremely common in the community" [9] there were marked differences in the pattern of anxiety disorders between the studies. The six-month rate of generalised anxiety of 8% in the CPES for 18-24 year olds was much higher than the one-year rate in the Dunedin study (2%). However, the rates of social phobia and obsessive compulsive disorder were three to four times higher in the Dunedin study. The higher rates for social phobia may be peculiar to this developmental period because of increased demands on social performance. The emphasis on social and relationship functioning was the most commonly cited source of concern for those with generalised anxiety. The difference in estimates for generalised anxiety between the studies may have been largely due to the more rigorous criteria in the DSM-III-R system: for example, a minimum duration of symptoms of six months compared with a minimum of only one month in DSM-III. The prevalence estimates of depression (for which the

DSM-III and DSM-III-R criteria are more similar) were more comparable. The rate of dysthymia was similar in Dunedin (3% compared with 2%) but the rate of MDE was higher than in Christchurch (17% and 5% respectively). The rate of alcohol abuse/dependence in the CPES study (for 18-24 year-olds) was slightly higher than the rate of dependence in Dunedin (13% and 11% respectively). These figures are fairly similar, given that the Dunedin sample was younger and criteria for full dependence rather than abuse were applied. The rate of antisocial personality disorder (APD) in the CPES was less than the rate of conduct disorder in Dunedin (2% compared with 6%). However, although the classification of APD encompasses a broader range of behaviours than that of conduct disorder, it also utilises age of onset data. The development of APD in the Dunedin sample will be examined as a topic in its own right using data from earlier assessments.

The validity of any study reporting prevalence estimates must be open to question. In the present study, efforts were made to ensure that the classification of "disorder" was made in a conservative fashion. The presence of symptoms was based on definite responses to each item, and once the initial criteria were met additional criteria for impairment in life-functioning were applied. As the interview was modified from the original DIS and was administered with major time constraints, this additional impairment procedure added a degree of confidence to the classifications made. In Bird *et al's* study of Puerto Rican children aged 4 through 16, 50% initially met criteria for a DSM-III disorder [22]. The authors contended that to conclude that half the children were psychiatrically disturbed would be "implausible", and as some of those children would not be considered "cases" on clinical grounds they should not be considered so for epidemiological purposes. Using impairment criteria they subsequently identified 34% as being definite or possible "cases." While this research was conducted with a sample younger than that of the Dunedin study, it appears to be an appropriate strategy to employ in the determination of prevalence estimates. In the Dunedin study it was not practicable to conduct validity studies using comprehensive and independent psychiatric evaluations as "gold-standard" criteria. However, the analyses of the reliability data indicated that the reliability for most disorder domains was satisfactory. The lowest agreement was for the anxiety disorders, and the scale with the least consistency was

that for conduct behaviours - the disorder types perhaps more likely to be situation dependent in this age group. There was also no evidence to suggest that respondents were “mechanically” responding or responding in a socially desirable way which could have led to a reduction in symptoms at re-test (“re-test artefact”) [29].

The results of the present study have a degree of “face-validity”, given the longitudinal nature of the project. In longitudinal studies of childhood psychopathology it can be common to lose 20-30% of subjects; in studies of adolescent substance use, in particular, losses of 20% to 55% are “not unusual” [30]. The follow-up rate (ages 3 to 18) in the present study of more than 90% is very high and reduces the possibility of a non-response bias, a major source of systematic error in other cross-sectional and longitudinal studies.

Earlier reports from the Dunedin study [11,13,31] have described considerable co-morbidity or overlap among disorders, and this was evident in the present study. Overall, 640 instances of disorder were experienced by 340 individuals. Within each disorder domain there was considerable overlap, and marked overlap between the domains. There were marked differences in the strength of association between the types of disorder and the various background characteristic variables. The results pertaining to the internalising and externalising categories of disorder suggest that although nearly all the characteristics examined were significantly associated with “mixed” disorder, they may be more associated with certain disorder types. For example, poor health and suicidal ideation were strongly associated with internalising disorder, whereas disadvantage and poor social competence were more strongly associated with externalising disorder. On the other hand, self-medication would appear to be a characteristic associated with all types of disorder in this age group. The association between age and externalising disorder is likely to be a reflection of the logistical problems in organising assessments for those individuals. They were more likely to miss appointments and require re-scheduling at later dates.

As the results of the present study were cross-sectional, inferences about causality should be made cautiously. Nevertheless, it is feasible that interventions to reduce the prevalence of adverse associated characteristics, such as social competence and disadvantage, may reduce the risk of externalising disorder.

This is particularly so for disadvantage as the index related to life events and situations that may have occurred some time prior to the age 18 assessment. The association between poor-ratings of health and disorder may largely be due to increased somatic complaint among those with internalising disorders. However, if there is some causal direction from poor physical health to mental ill-health it is also conceivable that preventive strategies aimed at enhancing the physical health of adolescents may reduce the likelihood of all forms of disorder.

The reports obtained from a “significant other” were particularly interesting from methodological and clinical perspectives. First, the use of self-nominated significant others appears to be a most promising method of obtaining collateral information. An initial concern that self-nomination of friends may lead to poor response rates was unjustified. The quality of the friends’ responses was high, and many made the effort to add additional comments about what they felt to be the source of the individual’s distress or problems. Some also added comments describing aspects of resilience and positive attributes. As peers responded well to the approach used in the present study and appear to be a source of valid and considered opinion, it strengthens the arguments for their use in research where collateral information is desirable. This is particularly so in studies of adolescence and early adulthood, when research subjects may not favour researcher contact with parents. The present findings also may lend support to the utilisation of peers in a proactive fashion, incorporating them in preventive or intervention studies. Those researchers reluctant to utilise peers as agents or facilitators of change could certainly still use their reports for baseline, outcome and process monitors.

Second, the finding that around a third of those with disorder were recognised as having problems is encouraging from a clinical perspective. Half of those with substance dependence were recognised as having alcohol or marijuana related problems. This would suggest that interventions aimed at assisting peers and parents to recognise disorder (particularly early on), and encourage help-seeking by the individual, may be beneficial in improving access to appropriate health professionals. The lack of recognition for anxiety disorders may well reflect the high prevalences of social and simple phobias. What may be of some concern is the finding that anxiety without depression was also associated with suicidal ideation, and this may not be

recognised by others who may be able to facilitate help-seeking or arrange referral. In general, although it is likely that while some individuals may benefit from the recognition of their problem it is also possible that some parental or peer responses and behaviour may reinforce the behaviour of concern. This is particularly important for those disorders in which modelling by peers is a suggested aetiological factor; for example: conduct disorder and substance dependence [32, 33, 34], eating disorders [35], and perhaps most importantly, suicidal behaviour and ideation [36, 37].

This paper has described the prevalence of the major disorders of mental health and their correlates in a cross-sectional study of 18-year olds. Other researchers have argued that resources should be directed to child and adolescent mental health services in order to minimise later distress and disability [6]. Such decisions relating to research and service resource allocation should be based on sound and timely data, and results such as those from the present study can form a useful resource for clinicians and service planners dealing with this particular age group. This is especially so for those who work with adolescents in community settings or who are designing primary and secondary prevention strategies. Further papers from the DMHDS will describe the continuity of mental health disorder from mid-adolescence (age 15) to early adulthood (age 18), and determine if earlier events and characteristics predict that continuity.

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References

1. Ben-Tovim DI, Subbiah N, Scheutz B, Morton J. Bulimia: Symptoms and syndromes in an urban population. *Australian and New Zealand Journal of Psychiatry* 1989; 23:73-80.
2. Coker RR, Coverstone KL, Schultz DM, Vincent KR. DSM-III-R diagnosis and code types of the Diagnostic Inventory of Personality and Symptoms in an adolescent clinical population. *Journal of Clinical Psychology* 1990; 46:839-845.
3. Lancelot C, Brooks-Gunn J, Warren MP, Newman D. Comparison of DSM-III and DSM-III-R bulimia nervosa classifications for psychopathology and other eating behaviors. *International Journal of Eating Disorders* 1991; 10:57-66.
4. Myers WC, Kempf JP. DSM-III-R classification of murderous youth: Help or hindrance? *Journal of Clinical Psychiatry* 1990; 51:239-242.
5. Rey JM. The Epidemiologic Catchment Area (ECA) study: implications for Australia. *Medical Journal of Australia* 1992; 156:200-203.
6. Kosky R, Hardy J. Mental health: is early intervention the key? *Medical Journal of Australia* 1992; 156:147-148.
7. Rutledge J, Brinsdon S, McLennan T, Borman B. *Mental Health Data 1988*. Wellington: Department of Health, 1991.
8. Wells JE, Bushnell JA, Hornblow AR, Joyce PR, Oakley-Browne MA. Christchurch Psychiatric Epidemiology Study, Part I: methodology and lifetime prevalence for specific psychiatric disorders. *Australian and New Zealand Journal of Psychiatry* 1989; 23:315-326.
9. Oakley-Browne MA, Joyce PR, Wells JE, Bushnell JA, Hornblow AR. Christchurch Psychiatric Epidemiology Study, Part II: six month and other period prevalences of specific psychiatric disorders. *Australian and New Zealand Journal of Psychiatry* 1989; 23:327-340.
10. Silva PA. The Dunedin Multidisciplinary Health and Development Study: a 15 year longitudinal study. *Paediatric and Perinatal Epidemiology* 1990; 4:76-107.
11. Anderson JC, Williams S, McGee R, Silva PA. DSM-III disorders in preadolescent children: prevalence in a large sample from the general population. *Archives of General Psychiatry* 1987; 44:69-76.
12. Frost LA, Moffitt TE, McGee R. Neuropsychological correlates of psychopathology in an unselected cohort of young adolescents. *Journal of Abnormal Psychology* 1989; 98:307-313.
13. McGee R, Feehan M, Williams SM, Partridge F, Silva PA, Kelly J. DSM-III disorders in a large sample of adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry* 1990; 29:611-619.
14. Elley WB, Irving JC. A socio-economic index for New Zealand based on levels of education and income from the 1966 census. *New Zealand Journal of Educational Studies* 1972; 7:153-167.

15. Robins LN, Helzer JE, Cottler L, Goldring E. NIMH Diagnostic Interview Schedule: Version III Revised. Written under contract to the NIMH, 1989.
16. Robins LN, Helzer JE, Croughan J, Ratcliff KS. National Institute of Mental Health Diagnostic Interview Schedule: its history, characteristics and validity. *Archives of General Psychiatry* 1981; 38:381-389.
17. Regier DA, Myers JK, Kramer M, Robins LN, Blazer DG, Hough RL, Eaton WW, Locke BZ. The NIMH epidemiologic catchment area program: historical context, major objectives, and study population characteristics. *Archives of General Psychiatry* 1984; 41:934-941.
18. Helzer JE, Robins LN. The diagnostic interview schedule: its development, evolution and use. *Social Psychiatry and Psychiatric Epidemiology* 1988; 23:6-16.
19. Robins LN, Helzer JE, Orvaschel H, Anthony JC, Blazer DG, Burnam A, Burke JD. The Diagnostic Interview Schedule. In: Eaton WW, Kessler LG, eds. *Epidemiological field methods in psychiatry: the NIMH catchment area program*. Orlando FL: Academic Press, 1985.
20. Huizinga D. Denver Youth Survey Youth Interview Schedule. Boulder, CO: University of Colorado, Institute of Behavioural Science, 1989.
21. Shapiro S, Skinner EA, Kessler LG, Von Korff M, *et al.* Utilization of health and mental health services. *Archives of General Psychiatry* 1984; 41:971-982.
22. Bird HR, Yager TJ, Staghezza B, Gould MS, Canino G, Rubio-Stipec M. Impairment in the epidemiological measurement of childhood psychopathology in the community. *Journal of the American Academy of Child and Adolescent Psychiatry* 1990; 29: 796-803.
23. Williams S, McGee R. Adolescents' self perceptions of their strengths. *Journal of Youth and Adolescence* 1991; 20:325-337.
24. McGee R, Williams SM. Social competence in adolescence: preliminary findings from a longitudinal study of New Zealand 15 year olds. *Psychiatry* 1991; 54:281-291.
25. Sanson-Fisher RW, Martin CJ. Standardized interviews in psychiatry: issues of reliability. *British Journal of Psychiatry* 1981; 139:138-143.
26. Landis JR, Koch GG. A one-way components of variance model for categorical data. *Biometrics* 1977; 33:671-679.
27. Dunn G. Design and analysis of reliability studies: the statistical evaluation of measurement errors. New York: Oxford University Press, 1989.
28. Bartko JJ, Carpenter WT. On the methods and theory of reliability. *Journal of Nervous and Mental Disease* 1976; 163:307-317.
29. Jorm AF, Duncan-Jones P, Scott R. An analysis of the re-test artefact in longitudinal studies of psychiatric symptoms and personality. *Psychological Medicine* 1989; 19:487-493.
30. Boyle MH, Offord DR, Racine YA, Catlin G. Ontario Child Health Study follow-up: evaluation of sample loss. *Journal of the American Academy of Child and Adolescent Psychiatry* 1991; 30:449-456.
31. McGee R, Feehan M, Williams SM. Co-morbidity of anxiety disorders in childhood and adolescence. In: Burrows GD, Roth M, Noyes R Jr, eds. *Handbook of anxiety. Volume 5: Contemporary issues and prospects for research in anxiety disorders*. Amsterdam: Elsevier, 1992.
32. Patterson GR, Debaryshe BD, Ramsey E. A developmental perspective on antisocial behavior. *American Psychologist* 1989; 44:329-335.
33. Marcos AC, Bahr SJ, Johnson RE. Test of a bonding/association theory of adolescent drug use. *Social Forces* 1986; 65:135-161.
34. Smith MB, Canter WA, Robin AL. A path analysis of an adolescent drinking behaviour model derived from problem behaviour theory. *Journal of Studies on Alcohol* 1989; 50:128-142.
35. Crandall CS. Social contagion of binge eating. *Journal of Personality and Social Psychology* 1988; 55:588-598.
36. Brent DA, Kerr MM, Goldstein C, Bozigar J, Wartella M, Allan MJ. An outbreak of suicide and suicidal behavior in a high school. *Journal of the American Academy of Child and Adolescent Psychiatry* 1989; 28:918-924.
37. Gould MS, Wallenstein S, Davidson L. Suicide clusters: a critical review. *Suicide and Life-Threatening Behaviour* 1989; 19:17-29.
38. Schoenberg BS. Calculating confidence intervals for rates and ratios. *Neuroepidemiology* 1983; 2:257-265.
39. Everitt BS. The analysis of contingency tables. London: Chapman & Hall, 1977.