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Review Article

The Relationship of Anxiety and Depression: A Review of the Literature

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The nature of the relationship between anxiety and depression has been much debated. The research in the past 15 years is reviewed in the context of three conceptual models: (a) anxiety and depression differ quantitatively; (b) anxiety and depression differ qualitatively; and (c) combined anxiety and depression syndromes (anxious depressions) differ both quantitatively and qualitatively from either pure anxiety or pure depression. The major areas of research—phenomenological, treatment, course and outcome—are considered and findings in support of each position reviewed.

In recent years, there has been an increased emphasis on the phenomenology of the various disorders of mood. This has received its impetus from attempts to construct a clinically relevant taxonomy of the affective disorders by identifying operationally defined criteria to delineate one disorder from another. This is difficult because of complex symptom patterns in which there is considerable overlapping of symptomatology between two disorders. Such is the case with anxiety and depression. There are many anxious patients who present with concurrent symptoms of depression, and many depressed patients who present with concurrent symptoms of anxiety. How these patients are diagnosed has implications for both treatment and prognosis.

This paper reviews the literature on the relationship between anxiety and depression over the last 15 years. It is not an exhaustive review but an attempt to consider the major research areas for future study. An overview of the nosological problems inherent in understanding how anxiety disorders and affective disorders are related can be found in Snaith (1981).

Review of Existing Literature

Currently there are two opposing conceptual models, as well as a third intermediary position defining how anxiety and depression are related. These focus on anxiety and depression as; (a) variants of the same disorder differing quantitatively (unitary model); (b) distinct disorders differing qualitatively (pluralistic model); and (c) a mixture of the two syndromes, phenomenologically different from either primary anxiety or primary depression (anxious depressive position). The following is a description of each position, the variables on which anxiety and depression have been compared, and the research findings on which the model is based.

Unitary Position

Clinical variables: The overlapping of clinical symptomatology between anxiety and depression has been cited as the greatest source of support for the conceptualisation of the two disorders as represented by a continum. Gersh & Fowles (1979) conceive of them as two symptomatic stages of affective disorder with the ratio of anxiety and depressive symptoms varying over time such that the diagnosis depends upon when in the course of illness the evaluation is made. This was supported by Kendell (1974), who studied the stability of clinical diagnosis over a period of five years: comparing the diagnoses of 2,000 patients for two separate hospital admissions, there was a change in diagnosis from anxiety to depressive disorder for 24%, while for 2%, the change was in the opposite direction.

Studies of patients suffering from anxiety neurosis have found a high prevalence of depressive symptoms, severe enough to qualify for a secondary diagnosis of depression, while secondary anxiety has been found to occur in a comparable percentage of depressed patients (Fawcett & Kravitz, 1983). Estimates of depressive symptoms in anxious patients are as high as 65% (Roth *et al*, 1972): irritability, mild agoraphobia, anxiety, agitation, and ideas of guilt were common in both the anxious and depressed patients in their sample. Clancy *et al* reported that 44% of their sample of 112 anxious patients, interviewed six years after their key illness, were diagnosed as having a secondary depression in

TABLE I
Unitary position

Study	*Subject population*	*Variable(s) examined*	*Results*
Roth *et al*, 1972	Anxious and depressed inpatients	Clinical symptoms	65% of anxious patients had concurrent depressive symptoms
Fawcett & Kravitz, 1983	Research Diagnostic Criteria for major depression	Clinical symptoms	42% of major depressive disorder patients had moderate worry; 29% had history of panic attacks; 19% had moderate phobic symptoms
Dealy *et al*, 1981	General anxiety or panic attacks	Clinical symptoms	33% had secondary depression
Clancy *et al*, 1978	Experimental-anxiety neurotic and general medical patient control—surgical patients	Clinical symptoms	44% of anxious neurotics had secondary depression
	Secondary depression	Family history	No differences in family history for anxiety and/or depression between pure anxiety group and mixed anxiety depression group
		Course/outcome	Average of five years from onset of anxiety to development of depression
Lesse, 1982	Anxiety patients	Course/outcome	Stress—anxiety—depression axis
Kelly & Walter, 1969	3 clinical groups, 1 normal group	Personality traits	No difference in neuroticism score (Maudsley Personality Inventory) of anxious and depressed patients
Johnstone *et al*, 1980	Unselected non-psychotic outpatients with scores of 2+ on observed anxiety, depression, or both	Treatment response	Amitryptyline resulted in improvement for both anxiety and depression
		Rating scales	Ratings of anxiety and depression did not disciminate between the two groups; correlation between two sets of scales increased over time
Mendels *et al*, 1972	Female psychiatric inpatients	Rating scales	Failure to find separate anxiety depression factors; high correlation between anxiety and depression rating scales
Schapira *et al*, 1971	Anxious and depressed inpatients	Prognosis	Anxiety states of long standing tended to acquire depressive symptoms

addition to the primary diagnosis of anxiety, compared to 7% of a surgical control group. Their findings were replicated by Dealy *et al* who reported that 33% of their patients had a diagnosis of secondary depression. An association between panic attacks (anxiety neurosis) and depression has also been found: Dealy *et al* reported that 64% of their anxious patients who experienced panic attacks had secondary depression, compared to 29% without secondary depression, while analysis of the data of Fawcett & Kravitz revealed that 29% of their depressed sample had concomitant panic attacks.

Both Clancy *et al* and Dealy *et al* in their studies of anxious neurotic patients who were either diagnosed as having a secondary depression or not, found no difference between the two groups in terms of mean age of onset, duration of illness, suicide attempts, or family history of psychiatric illness. This led them to conclude that depression and anxiety were clinical variants of the same disorder.

Treatment and treatment response: Further support for an unitary orientation comes from treatment studies in which anxious patients have responded favourably to antidepressants (Kelly *et al.* 1969; King, 1962; Sargant & Dally, 1962), and for which success has been reported with anxiolytics in depressed patients (Henry *et al*, 1970; Hollister *et al*, 1967; Overall *et al*, 1966). Johnstone *et al* (1980) found no significant drug effect which could differentiate patients on the basis of either clinical or

self-ratings of anxiety and depression: amitriptyline proved to be superior to diazepam in the treatment of both anxious and depressed patients.

Course and outcome: The concept of anxiety and depression as a continum has been further supported by research which has hypothesised the aetiological factor of anxiety in depression. Roth *et al* (1972) reported an early age of onset for anxiety compared with depression, and noted that long-standing anxiety states tended to acquire predominant depressive characteristics with the passage of time (Schapira *et al*, 1972); Clancy *et al* found an average length of five years between the onset of anxiety and the development of secondary depression. In agreement with this position is the stress→anxiety→depression axis postulated by Lesse (1982) to explain the relationship between the two disorders. While not ruling out the possibility that in some situations, depression may be the primary response to stress, Lesse stated that he had not been able to document an acute or subacute severely depressed state in a patient who had not manifested symptoms and signs of anxiety prior to the onset of depression. Hays (1964) also reported that many depressive reactions are preceded by prodromal periods of chronic anxiety.

Rating scales: The failure to find separate factors of anxiety and depression (Mendels, 1972; Johnstone *et al*, 1980) in anxiety and depression rating scales, and the high correlation between the two sets of scales have also been cited as evidence for the quantitative model. Mendels *et al* (1972) factor-analysed the scores of six self-rating mood scales; analysis of the data for 76 female psychiatric inpatients resulted in the extraction of two factors accounting for 68% of the total variance. All of the scales, except for two of the MMPI, loaded highly on the first factor, suggesting that it constituted a dimension of general psychiatric disturbance. They concluded that in a psychiatric sample, homogeneous as to sex, self-rating scales of anxiety and depression do not separate different sets of symptoms.

This failure to find separate factors might have been dismissed as being due to the relative unreliability of self-reports of behaviour, but it was also demonstrated to be true of observer-rated scales. In their study of treatment response to anxiolytics and antidepressants, Johnstone *et al* rated their patients on the Hamilton Depression Inventory and the Hamilton Anxiety Inventory at several specified time-intervals during the trials. For all patients, the correlation between ratings of anxiety and depression increased over time; at week one, it was +0.53, while at week five it had increased to +0.77.

Thus, the unitary position for the relationship of anxiety and depression is supported by the overlapping of symptomatology between the two syndromes, by the lack of stability of the clinical diagnosis between anxiety and depression, by the similarity of anxious patients with and without secondary depression on several variables, by the tendency for patients suffering from long-standing anxiety states to develop depressive symptoms, by the failure to find separate dimensions of anxiety and depression in both self-rated and observer-rated scales, and by the lack of a specific response to drug treatment.

Pluralistic position

The most widely published advocates of the position that anxiety and depression are separate and distinct entities have been Roth *et al* (Newcastle Group). Their studies showed a separation between clinical groups of anxious and depressed patients in terms of a number of variables—clinical symptoms, personality, treatment and treatment response, course and outcome, prognosis, and rating scales. This Group, while cognisant of the overlapping of symptomatology between depression and anxiety, suggested that with the use of appropriate statistical methods, the two disorders could be shown to differ on certain dimensions. Tentative support for their viewpoint has been achieved, using the statistical techniques of principal components analysis and discriminant function analysis (Prusoff & Klerman, 1974; Derogatis *et al*, 1972a), although others have failed to replicate their results (Mendels, 1972; Johnstone *et al*, 1980).

The Newcastle Group published a series of studies establishing the independence of anxiety and depression. A sample of 145 inpatients, diagnosed as anxious or depressed on the basis of their predominant mood state, were evaluated—at the key illness and at follow-up—in terms of clinical variables, prescribed treatment and treatment response, personality and an outcome component used to assess prognosis. Mountjoy & Roth (1982a & b) replicated the earlier research on clinical variables, and extended the analysis to rating scales, but unlike the previous sample of inpatients, this one excluded patients with endogenous depression and included daypatients and outpatients.

TABLE II
Pluralistic position

Study	*Subject population*	*Variable(s) examined*	*Results*
Mountjoy & Roth, 1982(b)	Anxious and depressed inpatients, outpatients, and day patients	Clinical symptoms	Principal components identified a bipolar factor; discriminant function analysis separated the two groups
Newcastle Group, 1970–72, Roth *et al*, 1972, Schapira *et al*, 1971, Kerr *et al*, 1970, 1972	Anxious and depressed inpatients	Personality traits	Anxiety characterised by personality traits of dependence, immaturity, hysteria, neuroticism, and poor social adjustment; depressed more stable, mature and independent
Gurney *et al*, 1970, 1972			Anxiety states high neuroticism scores on Maudsley Personality Inventory; depression higher extroversion scores
		Treatment/treatment response	Depressed group more frequently prescribed ECT and tricyclics; anxiety group treated with sedatives & tranquillisers; better response to ECT and tricyclics for depressed group at discharge and at six month follow-up
		Course/outcome	Anxiety states had an earlier onset and a longer duration
		Prognosis	Poorer prognosis for anxiety states
		Family history	Greater neurotic illness in families of anxious patients
Zitrin *et al*, 1980	Agoraphobics	Treatment response	Negative relationship between depression in agoraphobics and response to imipramine
Mountjoy & Roth, 1982(a)	Anxious and depressed inpatients, outpatients, and day patients	Rating scales	Separate anxiety and depression dimensions
Prusoff & Klerman, 1974	Anxious and depressed out-patients	Rating scales	Discriminant function analysis of Symptom Checklist factors discriminated between anxious and depressed groups
Derogatis *et al*, 1972(a)	Outpatients with primary anxiety or depression	Rating scales	Identified depression factor in Symptom Checklist ratings of anxious and depressed groups; could not identify anxiety factor in depressed group
Crowe *et al*, 1980	DSM III criteria for panic disorder	Family history	Morbidity risk for panic attacks but not for other anxiety disorders or depression higher in anxious neurotics
Van Valkenburg *et al*, 1984	Anxious neurosis and depressed patients	Family history	Greater family history for depression in major depressive disorder patients
Kelly & Walter, 1969	Experimental-nonagitated depression control-normal	Response to stress	Anxious patients had mean basal forearm blood flow significantly greater than that of depressed patients

Clinical symptoms: Analysis of clinical symptoms for the anxious and depressed groups of the Newcastle studies demonstrated an earlier age of onset, greater prevalence of psychiatric disturbance in first-degree relatives, poorer social adjustment, personality traits of dependence and immaturity, and longer duration of the illness for the anxiety states, compared with the depressive illness (Roth *et al*, 1972).

Personality characterstics: Personality differences between the groups on the Maudsley Personality

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Inventory (Kerr *et al*, 1970) related to higher neuroticism scores and lower extraversion scores for anxiety states, compared to depressive states, both at key illness and at follow-up; it was concluded that the extraversion dimension represents a more stable aspect of personality, while neuroticism is primarily a measure of anxiety. These results were not replicated by Kelly & Walters (1969), who found no difference between their anxious and depressed patients in terms of the neuroticism score on the Maudsley Personality Inventory.

Treatment and treatment response: The anxious and depressed groups of the Newcastle studies also differed both in the prescribed treatment and in their response to two of four treatment strategies. Both ECT and tricyclic antidepressants were significantly more beneficial for the depressed group, in contrast to the anxious group; 24 out of the 28 depressed patients improved with ECT, compared with two out of the nine anxious patients; 23 out of the 27 depressed patients benefited from treatment with tricyclic antidepressants, whereas only five out of the 18 in the anxious group showed improvement.

Prognosis: The differentiation between anxiety states and depressive illnesses made on clinical grounds was upheld by differences in prognosis (Schapira *et al*, 1972): there was a consistent tendency for the whole range of symptoms studied at follow-up to be more frequent and more severe in the anxious group of patients. A principal components analysis, carried out on 53 items used in the assessment of mental state at follow-up, showed a better prognosis for depressive patients in terms of global adjustment.

Rating scales: Mountjoy & Roth (1982a) factor-analysed the scores from both observer-rated (Hamilton Scales for Anxiety and Depression, Newcastle Anxiety Depression Scale) and patient-rated scales (Zung Depression Scale, a scale for anxiety, phobic scales for agoraphobia and for school phobia). All of the scales loaded positively on the first component, which accounted for 44% of the variance; it was interpreted as a general factor of severity, and there was no significant difference between the diagnostic groups in their mean scores on this component. The second component was bipolar, and a subsequent discriminant function analysis separated the two clinical groups at a statistically significant level, resulting in a miss-classification rate of 32%.

Prusoff & Klerman (1974) analysed the Symptom Checklist, a 58-item self-report inventory. Their sample consisted of 364 anxious outpatients and of 364 depressed patients, matched with the anxious group for race, sex, age, and social class. Previous factor analysis of the Symptom Checklist had identified five separate factors: the patients' scores on these factors were analysed by discriminant function analysis. The depression and somaticism factors contributed to the discrimination between the groups, while the anxiety factor failed to make a significant contribution to the discrimination. Similar results were reported by Derogatis *et al* (1972a), who examined the factorial invariance for the same scale. A factor analysis of the scores of 641 anxious neurotic outpatients and 251 neurotic depressed patients identified a depression factor in both groups, but the anxiety factor was only identified in the anxious group. It was concluded that the different pattern of factor loadings of the two groups on the depression dimension were evidence for differences between anxious and depressive syndromes.

Family history: Several investigators have cited differences in terms of family history between the two disorders as supportive of the pluralistic model. Roth *et al* found a greater prevalence of neurotic illness and personality disorder in first-degree relatives of anxious patients, whereas van Valkenburg *et al* (1984) found a greater family history for depression in patients diagnosed as primary affective disorder. Crowe *et al* (1980), in a sample of patients with anxiety neurosis (panic attacks), reported a higher morbidity risk in first-degree relatives for panic disorder but not for other anxiety disorders or for depression.

Physiological: There is physiological evidence in support of the separate entity hypothesis (Kelly & Walter, 1969): when subjected to experimentally induced stress, anxious patients had a mean basal forearm blood flow significantly greater than that of depressed patients. Mountjoy & Roth (1982b) also found a tendency for anxiety states to show increased physiological response, while depressive states were frequently associated with psychological response to stress.

In summary, the differentiation of anxiety states from depressive states in adults has been made on the basis of clinical items, rating scales, prognosis, personality, treatment response, course and outcome, physiological response to stress, and family history data.

TABLE III
Anxious depression position

Study	*Subject population*	*Variable(s) examined*	*Results*
Van Valkenburg, *et al*, 1984	1) Primary anxiety (panic attacks) 2) Primary depression 3) 2 mixed groups of anxiety and depressive syndromes		In general, differences between the "pure" and "mixed" groups were found on the variables under examination
		Clinical symptoms	"Mixed" groups showed increased agitation, hypochondriasis, depersonalisation, derealisation, chronic depression
		Treatment response	Increased proportion of "mixed" group failed to improve when given spectrum of pharmacological and psychosocial intervention
		Course/outcome	"Mixed" groups more likely to have poor psychosocial outcome; more chronic course
		Family history	"Mixed" groups did not differ significantly in family history of depressive or anxiety disorders
Clancy *et al*, 1978	Anxious patients with and without secondary depression	Course/outcome	Anxious neurotics with secondary depression have a more severe and chronic illness
Schapira *et al*, 1971	Anxious and depressed inpatients	Prognosis	Anxiety symptoms in depressed patients and depressive symptoms in anxious patients indicated poorer prognosis
Paykel, 1971	Depressed inpatients, outpatients, day patients, emergency patients	Rating scales	Factor analysis delineated a subgroup of depression characterised by anxiety and tension

Anxious-depressive position

In addition to anxiety and depressive disorders, a group of patients has been identified with coexistent anxiety and depression; while seeming to support the unitary position, this group show phenomenological differences from either generalised anxiety disorder or major depressive disorder. Overall *et al* (1966) factor-analysed the Brief Psychiatric Rating Scale scores of a sample of male inpatients; this divided the sample into three sub-groups, with one (anxious-tense) characterised by anxiety, tension, and depression. Similarly, Paykel (1971) identified by cluster analysis a group suffering from both anxiety and depression.

Downing & Rickels (1974) compared target symptomatology, illness history, and prognosis for a sample of patients with a mixed anxiety-depression diagnosis assigned to treatment with either antidepressant or anxiolytic drugs. They concluded that the group with mixed symptomatology demonstrated differences in terms of clinician and patient ratings of anxiety, depression, and treatment response; and that the diagnosis of mixed anxiety depression was not representative of a homogeneous group.

Van Valkenburg *et al* (1984) examined the validity of the anxious-depressive syndrome in a sample of 114 patients who met the diagnostic criteria for anxiety neurosis (DSM-III panic disorder) and/or for depression. This differed from the study by Downing & Rickels (1974) in the use of panic attack as a clinical marker for anxiety syndromes and in the use of operationally defined criteria to delineate their groups, thereby greatly enhancing the homogeneity of the diagnostic groupings. The assessment of the groups was on several variables—clinical symptoms, course and outcome of the illness, and family history. In terms of clinical symptoms, the groups in which there was a mixture of anxiety and depression showed a marked similarity, with observed

differences attributed to severity; both groups had a similar family history of psychiatric illness. In contrast, significant differences between the groups of anxious depressives and those with primary anxiety or primary depressive disorder were reported for treatment response, psycho-social adjustment, and prognosis. The finding that functioning is most impaired in those patients in whom anxiety and depression co-exist corroborated earlier research. Clancy *et al* compared anxious neurotics with and without secondary depression: their anxious-neurotic group who subsequently developed secondary depression had a more serious course and outcome, leading to the conclusion that anxious patients who develop a secondary depression have a more severe and chronic anxiety illness, which predisposes them to depression.

In summary, research indicates that when the two syndromes coexist, there is increased chronicity of the illness, reduced response to conventional therapies, and a poorer prognosis. Anxiety and depression in combination appear to represent both a quantitatively and qualitatively separate syndrome, unlike either anxiety disorder or affective disorder in many important respects.

Critical analysis of previous research

There are many sources of discrepancy in the studies examining the relationship between anxiety and depression. These range in scope and severity from the relatively minor inconsistencies in scoring procedures to major issues concerning semantic, methodological and interpretative differences. These discrepancies could, directly or indirectly, give rise to the observed results, thereby helping to explain some of the apparently contradictory findings.

Semantic inconsistencies: The largest stumbling block to the study of the relationship of anxiety and depression has been one of semantics, and relates to the multiplicity of the concepts of both anxiety and depression. Semantic inconsistencies between the various studies arise from two sources—discrepant use of the terms by investigators, and a lack of differentiation between the terms by patients in reporting on their symptoms. The introduction of operationally defined criteria for delineating the disorders has alleviated some of these difficulties, but confusion over the use of the two terms is still common among both clinicians and patients. 'Psychotic/endogenous' and 'neurotic/reactive' depressions are vague and ill-defined: they can either represent the two ends of a continuum, thus differing quantitatively, or two separate entities, differing qualitatively. In addition, the complaint of anxiety can denote a normal response variance, a trait, or a state, and has been used interchangeably with depression.

Methodological differences: The next largest source of variance between the studies has been methodological differences in sample populations, sources of data, range of symptomatology assessed, and level of analysis.

Sample selection: The procedures for selecting subjects have varied from preselection by clinical diagnosis to recruitment through radio advertising (Dealy *et al*, 1981) so that patients one investigator may exclude are the subjects for another study. Different exclusion and inclusion criteria have resulted in varied demographic as well as clinical patient characteristics of the samples—differences in terms of degree of psychopathology, sex, and socio-economic level. Studies included only outpatients, only inpatients, or a combination of both. Based on the assumption that inpatients are 'sicker' than outpatients or day patients, a study composed only of outpatients may not find the same association between anxiety and depression as one composed of inpatients. There is a similar lack of generalisability for samples homogeneous as to sex: three studies (Prusoff & Klerman, 1974; Mendels *et al*, 1972; Zitrin *et al*, 1980) included only female subjects, while in three others (Downing & Rickels, 1974; Derogatis *et al*, 1972a; Dealy *et al*, 1981), there were more women than men. Since data indicate that females report symptoms of anxiety and depression in greater numbers than males, results obtained in all female samples can only apply to other samples of females.

Samples have also differed in socio-economic level: both Prusoff & Klerman (1974) and Derogatis *et al* (1972a) excluded patients from the lowest social class because earlier research had indicated that the factor structure of a lower-status anxious group is qualitatively distinct from that of the other social classes. To what extent the results from research which has included lower class subjects are distorted is not presently known.

There are also inconsistencies in the homogeneity of the samples: sometimes heterogeneous groups have been intentionally selected (Mendels *et al*, 1972), while other samples have varied in their degree of homogeneity from the absence of diagnostic groupings (Johnstone *et al*,. 1980) to the use of a clinical marker for delineating groups (Van Valkenburg *et al*, 1984). The success of the various selection procedures in achieving homogeneity

depends to a great extent on the degree to which empirically defined criteria are used in the selection and diagnosis of the clinical groups. However, even this is not enough to assure comparable samples, since the claim that diagnoses were made according to DSM-III criteria is not sufficient to establish that these criteria were used as intended or as others have used them (Helzer & Coryell, 1983). In addition, many of the clinical diagnoses of the present studies were made prior to the advent of operationally defined diagnostic criteria.

Procedural differences: Procedural differences between studies also help to account for some inconsistent results. Differences in focus, in the nature and source of the data, and how the data are analysed vary across studies:

(i) Focus: The focus of studies on the relationship of anxiety and depression has ranged from discriminating anxiety from depression (Newcastle studies) to examining the etiological role of anxiety in depression (Clancy *et al,* 1978), to an assessment of clinical, family, and outcome variables in anxious-depressive states (Van Valkenburg, 1984).

(ii) Sources of data: Studies differ in the source of their data and in the degree of reliability inherent in those sources; in those reviewed, the source of information includes clinical interviews, observer-rated scales, patient-rated scales, physiological measures, and retrospective recall. Many have used clinical interviews for diagnosis, for obtaining clinical histories, or for rating the presence and severity of psychopathology. The interviews have varied in their degree of structure, whether the interviewer is the same person or a different one from the clinician who made the original diagnosis, whether the interviewer is 'blind' to the diagnosis, and to the number of raters present: all of these factors have a bearing on the reliability of the data obtained.

Observer-rated scales have generally been found to be a more reliable source of information about severity of psychopathology than self-reports of behaviour, which are subject to distortion either through the respondent 'faking bad' in a bid for attention or 'faking good' to appear mentally healthy. Denial of symptoms, especially in the acute phase of illness, has been cited as one of the major reasons for the low concordance between clinician and patient ratings (Prusoff *et al,* 1972). There is a similarly low concordance between patient and clinician ratings for bipolar depression (Donnelly *et al,* 1980). It becomes clear that the reliability of self-reports depends both on the type of depression (unipolar/bipolar) and on the stage in the illness at which the patient is assessed. Self-reports of behaviour also presuppose that the patient has the ability to analyse and make accurate judgement on his internal states, but this varies considerably from patient to patient, depending on such factors as intellect, verbal ability, and severity of the disorder. Clinician-rated scales give a more accurate picture of the disorder for several reasons. Firstly, they have the advantage of a far greater variety of behaviour on which to make judgements, e.g. facial expression, degree of tearfulness, amount of agitation or retardation, and body language. Secondly, the clinician has considerably more knowledge of the whole range of psychopathology, and thus a larger perspective on which to base his judgement.

The reliability of data in studies which have used retrospective recall of childhood events (Roth *et al,* 1972) or required the patient to reconstruct the course of an illness (Shapira *et al,* 1972) is questionable, as these reports are subject to errors of memory. Without substantiating evidence, they are generally an unsatisfactory source of information.

Range of psychopathology assessed: The selection of clinial items is also variable across studies, as is the choice of rating scales. Clinical items and rating scales which assess a wide range of symptoms have greater chance of finding significant differences between groups than fewer items which assess a narrower range of symptoms. Derogatis *et al* (1972a) cite the small number of items relating to anxiety on the Symptom Checklist as a plausible explanation for the failure to find a dimensional construct of anxiety in their sample of depressed neurotics.

Timing of disorder in relation to course of the disorder: Studies have also varied in the timing of the study: in some, the focus is on the current mental state while in others, it involves a follow-up assessment. Since the symptoms of anxiety and depression vary during the course of the disorder, different results could be a function of the length of time after the initial illness until the follow-up assessment.

Statistical analysis: There are also wide variations in the use of statistical techniques to analyse the data; these vary from univariate frequency counts, t-tests, and analysis of variance, to the sophisticated multivariate techniques of multiple regression, factor analysis, and discriminant function analysis. Many of the statistical tests have certain assumptions such as normality of the distribution and homogeneity of variance, which must be met if the results are to be

valid. Frequently, insufficient information is provided to assess whether these important assumptions have been met or not.

One misuse of statistical methods in several of the studies is evaluation of the differences in means between groups by multiple t-tests. When these are computed on the same data, the range of scores increases at a faster rate than the standard deviation, so that non-significant results will be erronously reported as significant.

Level of interpretation: The level of interpretation is also variable between studies, with some examining the relationship of anxiety and depression at the symptom level (Dealy *et al;* Clancy *et al*), while others examine differences at the level of factors (Newcastle studies; Prusoff & Klerman; Mendels *et al;* Derogatis *et al,* 1972a). Discussion at one interpretational level is not necessarily comparable with discussion at a different level.

There has also been some selectivity in what individuals choose to interpret as being significant: in the factor analysis of rating scales by Mountjoy & Roth (1982a), their first component accounted for 44% of the variance; all the scales loaded substantially on this component, and it was described as a general dimension of severity of psychiatric disturbance. This is basically the same result that Mendels *et al* obtained when they factor-analysed self-rated scales, but whereas Mendels *et al* chose to interpret this as evidence for the fact that anxiety and depression are variants of the same disorder, Roth & Mountjoy go on to interpret the second component, and use it is in a discriminant function analysis to demonstrate that anxiety and depression are separate entities. Thus, we have similar results interpreted very differently.

These semantic, methodological, and interpretational disparities between studies evaluating the relationship of anxiety and depression make it difficult to compare the results of one with another. Indeed, inconsistencies inherent in the various research designs may explain why one investigator gets one set of results while another, doing a similar procedure, gets the opposite set of results. The need for replication of the crucial studies is obvious, if the ambiguity in the present findings is to be resolved.

Discussion

Anxiety and depression are classified as separate disorders—clinically through DMS-III and statistically through discriminant function analysis. However, certain issues such as the presence of mixed anxiety/depression patients, the relatively high miss-classification rate (which casts some doubt as to the feasibility of being able to discriminate between anxiety and depression in clinical practice), and contradictory research findings suggest that there is no unequivocal solution to the problem of how anxiety and depression are related. Several issues are in need of clarification and resolution, including replication of research findings, cross-validation of discriminant function coefficients, assessments of biochemical markers as a means of separating the two groups, relationships within the sub-categories of each major disorder (e.g. endogenous depression and generalised anxiety disorder), and the relationship between anxiety and depression in children. Based on the assumption that childhood and adult psychopathology are continuous, an examination of the nature of this in children might help to clarify the relationship in adults.

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