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Intellectual Function in Primary Affective Disorder

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Summary: The possible effects of clinical depression on intellectual function were investigated in unipolar and bipolar patients. Ninety-six hospitalized depressed patients completed the Wechsler Adult Intelligence Scale (WAIS) on admission and 34 were retested on remission. The high average full scale IQs found remained relatively stable throughout, consistent with earlier studies indicating a limited relationship between intellectual function and clinical severity of depression. No evidence was found for retarded psychomotor activity in bipolar groups or increased psychomotor activity in unipolar groups on three WAIS subtests of psychomotor function, but full scale IQ increased slightly in hypomania.

Psychosis or even emotional conflict usually produces some attendant impairment in cognitive function. On observing the apparent clinical limitations of hospitalized depressed patients, one might expect coincident cognitive impairment. Indeed, when conceptualized as thought disorder (Braff and Beck, 1974; Donnelly *et al*, 1980a), this type of impairment has been reported in depression. Friedman (1964), however, has reported negligible cognitive impairment in depression, whereas Miller (1975), after reviewing the depression literature, concluded that cognition as measured by an intelligence test was impaired in manic-depressives as much as in schizophrenics. Thus, the question of cognitive impairment in the affective disorders remains obscured.

In self-report studies using the MMPI unipolar compared to bipolar groups reported more overall symptoms including depression, anxiety, obsessive feelings, and less adaptive defense mechanisms (Donnelly *et al*, 1980b; Donnelly *et al*, 1976). When an observer assesses function these differences between groups tend to disappear (Donnelly and Murphy, 1973). These scattered findings of psychological differences or similarities between unipolar and bipolar groups may therefore derive from something in the method rather than the groups themselves. The self-reported differences between groups may be more psychodynamically revealing than behavioral ratings because of the greater centrality of self-perception (e.g. MMPI) to the depressed state than apparent symptomatology (e.g. behavioural ratings).

We have assessed the possible effects of depression on intellectual function, as measured by the Wechsler Adult Intelligence Scale (WAIS), in a group of hospitalized patients. First, because there is evidence suggesting that severity of depression and impaired cognition do not covary (Donnelly *et al*, 1980a; Faibish and Kimbell, 1977), we expected that the IQs of depressed patients would show negligible improvement from admission to remission. Second, because a test of intelligence essentially requires more of an objective than a self-estimated performance, we expected that the IQs of the unipolar and bipolar groups would not differ significantly.

Methods

Subjects

The sample consisted of 96 admissions (66 women and 30 men) hospitalized for depression on two research units at the Clinical Center, National Institute of Mental Health, Bethesda, Maryland. Three patients were excluded from the study because of uncooperativeness with the testing procedure. Prior to hospitalization, all patients were screened for primary affective disorder according to the criteria of Feighner *et al* (1972). All these patients were assigned to either a unipolar (N = 40) or a bipolar depressed group (N = 56); the bipolar group was further separated into bipolar I (N = 38) and bipolar II (N = 18) subgroups. The unipolar group included patients with a history of depression only, and the bipolar group included patients with a history of mania severe enough to require hospitalization for specific treatment (bipolar I) or a history of defined hypomania (bipolar II). These diagnoses, which retrospectively fit the recently defined Research Diagnostic Criteria (Spitzer *et al*, 1975), resulted from interviews with patients and their immediate family, reports from other hospitals, and

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psychological testing. There were no significant differences across unipolar, bipolar, bipolar I and bipolar II groups on the variables of age, sex, race, and the number of previous hospitalizations. The bipolar II group, however, had significantly more years of education than either the unipolar or bipolar I groups.

Procedure

As part of the routine procedure after admission when all patients were off medication for approximately two weeks, 96 patients completed the WAIS; a subgroup of 34 patients was also retested on the WAIS at remission. Also from the initial sample, but not included in the test-retest group, six bipolar depressed women were tested on the WAIS during successive phases of depression, hypomania and recurrent depression, and one bipolar hypomanic woman was tested during successive phases of hypomania, depression and recurrent hypomania. The occurrence of a hypomanic period was based on a manic-state rating scale (Beigel and Murphy, 1971) score between four and six, indicative of clinically significant hypomanic symptoms. The limited size of this sample resulted from the difficulty in obtaining patients who were able to cooperate with testing during successive depressive and hypomanic periods with respective scores of 10–11 (severe depression) and 4–6 (hypomania).

Sixty-five patients from the initial sample of 96 also completed the MMPI. The D scale (depression) of the MMPI was included in this study to evaluate further the reported absence of relationship between severity of depression and level of intellectual function.

Results

Comparison of unipolar, bipolar I and bipolar II groups

The mean verbal IQs (VIQ), performance IQs (PIQ) and full scale IQs (FSIQ) of the 96 depressed patients were 111.07 (SD = 12.13), 103.57 (SD = 12.85) and 108.39 (SD = 11.66), respectively.

A multivariate analysis of variance (MANOVA) was performed, but there were no significant overall differences between unipolar and bipolar, unipolar and bipolar I, unipolar and bipolar II, or bipolar I and bipolar II groups.

Psychomotor function

Three measures of psychomotor speed on the performance scale (i.e. digit symbol, block design, and object assembly) using the Student t-test showed no significant differences between unipolar, bipolar, bipolar I, and bipolar II groups, except on the block design ($P < .02$) subtest between unipolar and bipolar groups, and the block design ($P < .01$) and object assembly ($P < .02$) subtests between unipolar and bipolar II groups. With few exceptions, all bipolar groups tended to have higher scores than the unipolar groups.

Admission and remission IQs

A two-factor repeated measures analysis of variance of the eleven WAIS subtests on admission and remission of the 34 unipolar and bipolar patients available for a second testing showed (a) a significant difference between the two time periods, $F(1,33) = 22.56$, $P < .01$, (b) a significant difference between subtests, $F(10,330) = 15.19$, $P < .01$, and (c) a non-significant time period × subtests interaction, $F(10,330) = 1.56$, $P > .05$.

A second two-factor repeated measures analysis of variance of the admission-remission IQs of these patients showed (a) a significant difference between admission and remission, $F(1,33) = 21.05$, $P < .01$, (b) a significant difference between the three IQ components, $F(2,66) = 12.15$, $P < .01$, and (c) a non-significant time period × IQ interaction, $F(2,66) = 1.40$, $P > .05$.

Subsequent t-tests using the Bonferroni correction (Miller, 1966), which preserves the integrity of the probability level against repeated t-tests, showed significant increases in all three IQ values (see Table I) but not in any of the subtests. The mean interval

TABLE I

Comparison of mean admission and remission IQs

	Admission scores (N = 34)		Remission scores (N = 34)			
IQs	$\bar{x}$	SD	$\bar{x}$	SD	t	P
Verbal	108.74	14.31	111.97	14.98	3.39	< .01
Performance	101.82	14.07	107.15	15.73	3.43	< .01
Full scale	106.32	13.82	110.44	15.32	4.61	< .01

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between test and retest was 7.78 months. To determine if the results obtained with the 34 patients showed the same relative frequency distributions as the entire sample of 96 patients, a MANOVA was performed and the results indicated that the former group was truly representative of the latter since there were no significant IQ differences between the group of 34 and the remaining group of 62.

IQ scores and depression

VIQs, PIQs and FSIQs and admission MMPI D scale scores of 65 patients on whom MMPI data were available yielded nonsignificant correlations of .01, .14 and .06, respectively. Significant positive correlations between D scale scores and PIQs were found in both the unipolar ($r(28) = .27$, $P < .05$) and bipolar I ($r(23) = .38$, $P < .01$) groups. The unipolar group had a mean D scale score of 95.95 (SD = 7.74) compared to a score of 71.90 (SD = 8.48) for the bipolar group $t(64) = 4.27$, $P < .01$.

IQ scores during hypomania vs depression

A Hotelling T^2 test indicated significant differences between the hypomanic period and the two depressive periods for Full Scale IQ (FSIQ) ($F(3,3) = 302.3$, $P < .01$). A paired t-test, with the Bonferroni correction, was used to determine the significance of mean IQ differences between the three testing periods. Inspection of the mean scores in Table II shows an increase in FSIQ during the hypomanic episode ($t(5) = 11.17$, $P < .01$) and a subsequent drop of FSIQ during the second depressive period ($t(5) = 2.59$, $P < .05$) to a level significantly different from the first depressive period ($t(5) = 3.15$, $P < .05$). This pattern of FSIQ function was also found in the VIQs and PIQs of five of the six bipolar depressed patients. The one patient with out-of-pattern scores had significantly higher FSIQ scores during the second depressive period compared to the first period.

The FSIQs of the one bipolar hypomanic patient tested during the reverse sequence of hypomania, depression and recurrent hypomania are also presented in Table II; VIQs and PIQs covaried with FSIQs.

Discussion

Since the premorbid IQs of our depressed population were unknown, we were not able to test directly the hypothesis that the onset of depression is associated with a decrement in intellectual function. On retest in the improved state, our population had significantly higher values for all three IQs compared to those initial IQs obtained earlier in their hospitalization. Although statistically significant, these increments can be explained in terms of the usual practice effect; these increments, however, are even lower than what would be expected after an approximate eight month test-retest interval; for example, Derner *et al* (1950) reported VIQ, PIQ and FSIQ increments in a normal population six months after the initial testing to be 4.1, 7.8 and 6.2, respectively, as against our our increments of 3.2, 5.3 and 4.1. Thus, the results indicating minimal improvement in IQ scores from admission to remission suggest both stability, not impairment, of intellectual function in patients hospitalized for depression, as well as a very limited relationship between level of intellectual function and the clinical severity of depression.

Several recent studies have reported increased frequency of psychomotor activity in unipolar patients, and retarded psychomotor activity in bipolar depressed patients (Bunney and Murphy, 1973; Kotin and Goodwin, 1972). In this study, however, WAIS subtests of psychomotor speed showed that the bipolar, and particularly the bipolar II group, usually had higher subtest scores than the unipolar group, suggesting less elicited retardation in the bipolar groups. Most studies confirming increased activity in unipolar patients and retardation in bipolar patients have used clinical observations or behaviour-rating scales, not a standardized task, as the dependent variable. In addition, two of the studies assessing psychomotor activity had very small samples (Dunner *et al*, 1976; Kupfer *et al*, 1974); it would seem that the results of these two and other related studies favouring increased psychomotor activity in unipolar and retarded psychomotor activity in bipolar patients are mainly consistent with spontaneous activity (i.e. clinically-based), whereas our results were obtained with elicited psychomotor activity (i.e. test-based).

TABLE II

Changes in full scale IQ during depressive and hypomanic episodes

	Depression	Hypomania	Depression	Hypomania
Mean of 6 patients	108.16±8.23	118.83±7.85	113.83±9.21	
Another case		106	98	118

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The results of testing during periods of depression alternating with hypomania suggest that hypomania is related to increased intellectual function. It could also be argued that IQ decrements during the depressive state are related to the disorder itself, and IQ increments concomitant with a shift to hypomania represent the absence of a depressive effect, not the effect of hypomania. But improvement in the depressive state does not result in IQ increments of sufficient magnitude to explain completely the IQ increments accompanying the hypomanic state. The present study has shown that practice effect alone can account for the FSIQ increment of 106.32 to 110.44 from admission to recovery (see Table I), respectively. Thus augmented IQs seem to be a function of hypomania, not epiphenomena of either the depressed or euthymic states. The drop in IQs during the second depressive period (see Table II) would also be consistent with hypomanic-related IQ increments.

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