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Does Personality Predict Long-Term Outcome in Depression?

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In 1965/66, a consecutive series of 89 in-patients with depression were interviewed, given two personality tests (the EPI and LOI), and were accorded a score on a neurotic–psychotic continuum (DI). Eighteen years later, the series was followed up and the predictive power of the original data was determined. High neuroticism scores on the EPI on recovery and particularly when ill but referring to the pre-morbid state were associated with poor overall outcome and chronicity. High obsessional interference scores on the LOI on recovery were also associated with poor long-term outcome, impaired social adjustment, more time spent in hospital, and with the subsequent development of schizophrenic or schizoaffective episodes. High psychotic scores on the DI were also associated with poor long-term outcome, a greater length of time spent in hospital, and with bipolar affective disorder, and this effect was independent of the personality measures.

Although personality abnormalities are common among those who develop depression (Charney *et al*, 1981; Shea *et al*, 1987), their effect on the natural history of that disorder is uncertain (Angst, 1988). There are major methodological difficulties to be overcome in investigating this relationship (Akiskal *et al*, 1983; Hirschfeld *et al*, 1983*a*), including a need to acknowledge the heterogeneity of depression, as subtypes of depression may have different outcomes (Hirschfeld & Cross, 1987). Furthermore, it is unclear whether personality measures taken during the illness are merely state markers of the severity of the illness (Hirschfeld *et al*, 1983*b*; Parker *et al*, 1985). There are then the additional problems of the selection and measurement of outcome factors, and the choice of a statistical procedure to model any relationship (McGlashan, 1984).

In order to relate personality measures to outcome in depression, therefore, one needs a clearly defined population of depressed patients on whom acceptable measures of personality have been made (preferably prospectively), with due regard being paid to the effects of abnormal mood on such ratings. In addition, consideration should be given to various dimensions of outcome, and these should be measured in some operational manner so as to facilitate cross-study comparisons. This 18-year follow-up study has been designed to meet these criteria and to address the following questions.

(a) Have personality measures any utility in predicting long-term outcome in depression?
(b) What is the relationship between any such personality variables and an individual's position on the neurotic–psychotic continuum, which has already established predictive effects?
(c) What is the process by which such measures determine outcome, and is there a relationship between the predictors and specific aspects of outcome?

Method

Index episode

Eighty-nine consecutive patients with a primary depressive illness requiring admission to the Maudsley Hospital were prospectively ascertained by R. E. Kendell in 1965/66 (Kendell, 1968). All of the patients meet Research Diagnostic Criteria for major depressive disorder (Spitzer *et al*, 1978). Each of the patients was accorded a position on a neurotic–psychotic continuum on the basis of his/her score on a diagnostic index (DI), itself the product of a discriminant-function analysis on a much larger series of depressed patients (Kendell, 1968). There were 27 men and 62 women, mean age 38.8 years (s.d. 12.2, median 39, range 16–67 years). Of this series, 39% had had at least one previous admission to a psychiatric hospital (Lee & Murray, 1988).

Personality assessments using the Eysenck Personality Inventory (EPI; Eysenck & Eysenck, 1964) and the Leyton Obsessional Inventory (LOI; Cooper, 1970) were made both at the time of the illness and when the patients were believed to have recovered (Kendell & Discipio, 1968, 1970). The EPI provides measures of extraversion and neuroticism, while the LOI produces four measures of obsessionality: symptom, trait, resistance, and interference. The EPI was administered twice when the patient was ill: on the first occasion with the standard instructions and, within a day or so, with the additional instruction "try to disregard your illness when answering these questions and answer yes or no according to how you feel or behave when you are your usual self". The purpose of this was to see if the effect of the illness on the personality scores could be discounted (Kendell & Discipio, 1968).

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Kendell also made a psychiatric assessment within a day or two of the personality estimation and classified the patients into the categories neurotic (reactive) ($n=49$, 54%) or psychotic (endogenous) ($n=40$, 46%). In addition, Kendell & Discipio (1968) graded the mood disturbance as mild, moderate, or severe.

Follow-up

The patients were followed up 18 years later by ASL, who was blind to these index data. Eighty-eight of the 89 patients were traced and 94% of the 65 survivors were personally interviewed; information on the longitudinal course of the illness was obtained as well as data on several other dimensions of outcome (Lee & Murray, 1988). The following measures were chosen as they cover the areas usually considered in such studies (McGlashan, 1984).

Longitudinal data were used to categorise outcome into four operationally defined groups, using the extremes of the frequency distribution of certain outcome variables as thresholds and then combining these with other gross measures of outcome such as unnatural deaths or leucotomy. This provided operational criteria for assessing outcome, to facilitate future cross-study comparisons.

A clinical rank ordering of the series was made in respect of global outcome ($n=86$), and the Global Assessment Scale (GAS; Endicott *et al*, 1976) provided a cross-sectional rating of overall functioning at follow-up.

Social adjustment was rated using the total score on the Social Adjustment Scale (SAS; Paykel *et al*, 1971).

The number of admissions and the total amount of time spent as a psychiatric in-patient after the index episode were determined. As the correlation between these two indices was very high, only the latter was used, in order to simplify the analysis.

The percentage of time lost from work because of psychiatric illness over the 18 years was estimated.

Chronicity was defined as at least two years of unremitting symptoms or a pattern of illness over the 18 years judged by two independent assessors to be chronic on the basis of the patients' self-reports and chart data.

Data analysis

Correlations between global outcome and all of the personality measures were calculated. For those in which there were significant associations, further multiple-regression analysis was performed to partition the effects between competing variables. Stepwise discriminant-function analysis was also used to relate these measures to specific diagnostic categories.

Results

Although the patient population differed slightly from that described by Kendell & Discipio (1968), analysis of our data corroborated their findings. We also found a significant difference between the extraversion (E) and the neuroticism (N) scores recorded when ill (with the standard instructions) and on recovery, such that E increased and N decreased with improvement in the patient's state. There was no significant difference, however, between the scores obtained on the EPI administered with the extra instructions to ill patients and to those who had recovered.

There was also a significant reduction in the various obsessional measures on the LOI after recovery, except for the trait measure, where the decrease did not reach significance.

(a) The predictive power of personality and the DI on long-term global outcome

Using the entire sample rank ordered, Pearson correlation coefficients were calculated for the various personality measures, recorded both when the patient was ill and on recovery. With one exception, none of the personality measures when the patient was ill showed any association with global outcome. The exception was the N score when ill but with the extra instruction to refer to the pre-morbid period ($r=0.28$, $P<0.02$). Two personality measures on recovery correlated significantly with global outcome: N again ($r=0.26$, $P<0.02$) and interference (I) from the LOI ($r=0.29$, $P<0.01$). Although two measures of neuroticism were positively associated with poor outcome, in the further analysis of this paper we report only on the more powerful predictor, that is, the measure when ill but with the extra instruction.

With the categorical data, we concentrated on categories 1 and 4, the 'best' and 'worst' outcome groups (Lee & Murray, 1988). In the 'best' category were 11 individuals whose lives subsequent to the index admission had been little affected by mental illness; the 25 patients in the 'worst' category were rarely free of psychiatric symptoms, spent a considerable time in a psychiatric hospital, and were very disabled in their social relationships. We split the personality measures into 'high' and 'low' groups based on their median value. Neuroticism emerged as the only predictive factor in the EPI, with high values being associated with poor outcome ($\chi^2=4.25$, $P<0.039$, d.f. = 1).

Individuals with a high DI score at the index admission, indicating a more 'psychotic' or 'endogenous' illness, were more likely to have a poor outcome as indicated by both categorical grouping ($\chi^2=6.41$, $P<0.01$) and rank ordering ($r=0.24$, $P<0.03$).

(b) Interaction of the personality measures predictive of outcome with one another and with the DI

Using multiple-regression analysis, we investigated whether (a) the association with global outcome of N, I, and DI scores remained significant when the other variables were held constant, and (b) whether there was any interaction between them. Table I shows that the associations of N and I overlap, so that after controlling for the effect of N on global outcome, the effect of I is no longer significant. However, after controlling for either of the personality measures, the effect of the DI remains significant. Further, either combination of the DI and N or the DI and I accounts for about 15% of the outcome variance. Thus the effects

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TABLE I
The relation of N, I, and DI scores to global outcome (clinical rankings)

Predictor variable	*No. of subjects*	*SRC*	F	P	R^2
(a) Other variables held constant					
Effect of N ignoring other effects	74	0.278	6.06	0.016	7.7%
Effect of I ignoring other effects	68	0.294	6.23	0.015	8.6%
Effect of DI ignoring other effects	86	0.241	5.16	0.026	5.8%
Effect of N controlling for effect of I	57	0.322	5.92	0.018	14%
Effect of I controlling for effect of N		0.119	0.81	0.37	
Effect of N controlling for effect of DI	74	0.229	4.21	0.044	14.9%
Effect of DI controlling for effect of N		0.271	5.93	0.017	
Effect of I controlling for effect of DI	68	0.287	6.27	0.015	14.4%
Effect of DI controlling for effect of I		0.241	4.43	0.039	
(b) Severity of mood disturbance at index held constant					
Effect of severity ignoring other effects	74	0.222	3.74	0.057	4.9%
Effect of severity controlling for effect of N	73	0.152	1.69	0.198	8.9%
Effect of N controlling for effect of severity		0.226	3.72	0.058	
Effect of severity controlling for effect of I	57	0.220	2.98	0.09	12.5%
Effect of I controlling for effect of severity		0.258	4.07	0.05	
Effect of severity controlling for effect of DI	74	0.133	1.28	0.26	11.7%
Effect of DI controlling for effect of severity		0.276	5.50	0.02	

SRC = standardised regression coefficient.
R^2 = % of variance accounted for by predictor.

of personality and depressive symptoms (as measured by the DI) on global outcome, although they operate in the same direction, are separate and distinct. Furthermore, there was no interactive effect between any of these three variables.

Severity of mood disturbance at the index admission on its own has a very limited capacity to predict outcome.

TABLE II
Spearman correlation coefficients (ρ) for N, I and DI with different indices of outcome

	Global outcome (clinical rankings)	*GAS score*	*SAS score*	*Weeks spent in hospital*	*% of time off work*
N					
ρ	0.25	−0.22	0.19	0.29	−0.02
P	0.03	0.10	0.20	0.03*	0.90
n	74	54	47	59	54
I					
ρ	0.24	0.24	0.32	0.32	−0.02
P	0.05	0.08	0.03	0.01	0.91
n	68	53	45	57	53
DI					
ρ	0.23	−0.05	0.04	0.35	0.31
P	0.04	0.70	0.76	0.003	0.01
n	86	63	55	69	63

When severity of mood is held constant then the capacity of the personality measures (i.e. N when ill but with extra instructions and I on recovery) to predict outcome is much reduced, whereas that of the clinical measure (DI) is not affected.

(c) The predictive effect of personality factors on certain specific outcome measures

Table II shows the results when the predictor variables are matched against various global and specific outcome measures using Spearman's correlation coefficient. There is some evidence for a differential association in the relationship between the predictor and outcome variables. For instance, while the DI is strongly associated with the total length of subsequent hospital stay, it has no significant association with social adjustment. Conversely, high I is associated with impaired social adjustment in addition to time spent in hospital. This suggests that the DI and I may have a differential association with global outcome through their relation to these specific outcome dimensions. Although N had a much weaker association with these specific outcome measures, it, alone of the three predictors, had an association with chronicity ($\chi^2 = 7.4$, $P = 0.006$, 74 subjects tested).

To identify a mechanism to account for this association, we turned to the longitudinal data of Lee & Murray (1988), specifically to their finding that a sizeable proportion of the series had developed additional psychiatric complications during 18-year follow-up. Could some of the predictive effect of DI and I be explained by the

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TABLE III

Prediction of the subsequent development of schizophrenic or schizoaffective episodes, or bipolar disorder either at index admission or subsequently

Predictor variable	*No. of subjects*	F	P	R^2
(a) Prediction of schizophrenic or schizoaffective episodes				
N	76	0.003	0.95	0.0%
I	69	3.26	0.075	4.6%
DI	88	0.29	0.59	0.0%
(b) Prediction of bipolar disorder				
N	76	0.18	0.67	0.0%
I	69	0.01	0.73	0.0%
DI	88	10.18	0.002	10.5%

development of these complications? We examined the development of schizophrenic and schizoaffecitve episodes (which we have analysed together as there were only 12 instances) and bipolar disorder either at the time of the index admission or developing later ($n = 17$) (Table III) and indeed found a differential relationship with I being related to schizophrenic and schizoaffective episodes, and DI to bipolar disorder. N is related to neither. Stepwise discriminant-function analysis on I, N and DI in relation to bipolar and schizophrenic/schizoaffective episodes confirmed these findings, with only the DI being entered for bipolar disorder ($F = 12.7$, $P < 0.0008$) and only I for schizophrenic/schizoaffective episodes ($F = 4.0$, $P < 0.05$).

Finally, we analysed the relationship between (a) the presence of bipolar disorder and the development of schizophrenic/schizoaffective episodes and (b) the outcome measures. This showed that while both of these groups had a poor global outcome, only the schizophrenic/schizoaffective group had poor social adjustment ($F = 8.94$, $P < 0.004$). Conversely, only the bipolar subgroup spent more time in hospital ($F = 8.56$, $P < 0.005$). This gives some support for high I scores being linked to poor global outcome via impaired social adjustment and subsequent development of schizophrenic or schizoaffective episodes; conversely, the DI is linked to global outcome through time in hospital and bipolar disorder.

Discussion

Even when depression is rigorously and reliably defined, its outcome varies widely. Why is this so? Part of the explanation is the variability inherent in attempting to measure outcome. This becomes obvious when, as in this study, multiple measures of outcome are analysed. The correlation coefficients between the specific outcome measures, for instance, varied from 0.19 to 0.75. Not surprisingly, therefore, differential associations were found between the different predictors and the various measures of outcome.

Abnormalities of personality, which are common among depressives, are also believed to account for some of this variability in outcome. For instance, their presence has been shown to lead to a poor response to antidepressants (Bielski & Friedel, 1976; Shawcross & Tyrer, 1985) and to a worse long-term prognosis (Weissman *et al*, 1978; Hirschfeld *et al*, 1986). Our results support their association with a poor long-term outcome. As personality abnormalities have been shown to lead to an earlier age of onset in depression (Charney *et al*, 1981), one might argue that their influence on long-term outcome is mediated by the length of illness. However, in this series, age of onset is not related to long-term outcome, and controlling for the effect of age (either at the onset of depression or at index) does not diminish the association between the personality measures and global outcome.

Several long-term follow-up studies have identified neuroticism as the personality factor that predicts poor outcome in depression (Kerr *et al*, 1974; Weissman *et al*, 1978; Hirschfeld *et al*, 1986). Our results corroborate this association. Moreover, they demonstrate that this effect is still noticeable after 18 years, which is a far longer follow-up than any previously reported. This apparent robustness has to be tempered by the finding that once allowance is made for the severity of the mood disturbance at the index admission (even though the patient was instructed to disregard current state), the predictive effect of the N score is markedly reduced. This corroborates the belief that the N scale in the EPI is partly confounded by the severity of the mood disturbance (Monroe & Steiner, 1986).

Our finding that neuroticism may be linked to poor long-term outcome through the development of chronicity supports other work in this area (Scott, 1988). As it has recently been suggested that individuals with high N scores are more likely to have abnormal cognitive processing about the self (Martin, 1985), this may explain why these individuals in our series had a chronic illness. This could be an indication that such an individual might benefit from cognitive therapy.

In contrast to neuroticism, comparatively little attention has been given to the prognostic utility of obsessional features in depression. This is surprising in view of the traditional psychoanalytic notions linking obsessional personality with depression (Chodoff, 1972) and the fact that various measures on the EPI and LOI have a significant correlation (Clifford *et al*, 1984). Indeed, the first study showing an overlap between the EPI and the LOI used this series of patients (Kendell & Discipio, 1970).

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retrospective assessment of case notes, with conflicting opinions as to the effect of obsessions on prognosis (Lewis, 1936; Myerson, 1936; Gittleson, 1966). Our design, which is prospective and uses a standardised assessment of obsessionality, identifies high obsessional interference on recovery as heralding a poor long-term prognosis. A partial explanation for this is provided by the development of schizophrenic/schizoaffective episodes in individuals with high I, which supports the notion that obsessionality is a protection against and a prelude to psychosis (Rosen, 1957). These patients particularly appeared to do badly in the area of social relationships and this corroborates a finding of the predictive effect of obsessional symptoms on the long-term (average 15 years) outcome in schizophrenia where again the individual's social functioning was affected (Fenton & McGlashan, 1986).

The prognostic value of the DI has been discussed by Lee & Murray (1988). It too is positively associated with poor global outcome, but this effect is independent of the personality measures. Some of this predictive power is mediated by its capacity to anticipate subsequent psychiatric complications, with the exception of schizophrenic/schizoaffective episodes. Thus, not only was a high DI score associated with bipolar disorder and a longer time spent in hospital, but the converse was also true. That is, a low DI was associated with the development of 'neurotic' complications such as phobias and panic attacks, and these complications also had a negative correlation with the further time spent in hospital.

Although the associations of the personality and clinical measures with global outcome were additive, their total effect was fairly modest. Not unexpectedly, perhaps, there is no single clear determinant of long-term outcome. As common sense would suggest, the complex pathways that make up the long-term natural history of an illness as heterogeneous as depression defy reduction to a simplistic formula or single explanation. However, when faced with a depressed patient, the clinician has to use whatever evidence is available to help predict the patient's future. In addition, he needs a rational plan of management. We suggest that the links identified here between the DI score and bipolarity, I and social adjustment, and N and chronicity, are a modest beginning; they also identify the areas where scarce resources may be targeted.

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