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The prediction of length of major depressive episodes: results from an epidemiological sample of female twins

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SYNOPSIS In order to examine factors that influence the time to recovery (TTR) from depressive episodes in women, we examined members of 1030 female–female twin pairs of known zygosity, ascertained from a population-based twin registry. We predicted, in a Cox model, TTR in 235 women with an onset of an episode of major depression (MD) in the last year meeting DSM-III-R criteria. The median and mean TTR for episodes of MD was 42 and 82 days, respectively; only 2·2% of women had not recovered by 1 year. Four variables predicted TTR: financial difficulties, obsessive–compulsive symptoms, severe life events (SLEs), and genetic risk. Dividing all depressive episodes meeting symptomatic DSM-III-R criteria into early (5–28 days) and late (> 28 days) phases, significant predictors of TTR early in the course of illness (income, parental protectiveness and separation, personality, lifetime traumas and SLEs) differed from those that predicted TTR later in the depressive episode (health, social support, obsessive–compulsive symptoms, SLEs and genetic risk). Including cases with chronic MD increased the strength of personality, financial problems and genetic risk as predictors of slow TTR. These exploratory analyses suggest that TTR from MD in women is influenced by multiple environmental, temperamental and genetic factors. Predictors of TTR early and later in the course of MD may differ qualitatively, suggesting different processes in recovery from brief *versus* prolonged depressions.

INTRODUCTION

Because the duration of episodes of major depression (MD) is so variable, it is of importance to understand the factors that influence time to recovery (TTR). As with the aetiology of MD itself, a wide range of factors have been examined as predictors of TTR, including personality, social support, early family environment, stressful life events, financial and interpersonal difficulties, prior history of depressive episodes and familial/genetic risk.

Most previous studies of TTR in MD have suffered from one or more of five potentially important methodological limitations. First, with few exceptions (Brown *et al*. 1988; Sargeant *et al*. 1990; McLeod *et al*. 1992; Brown & Moran, 1994), these studies were conducted in clinical and usually hospitalized populations. Secondly, all but a few such studies (e.g. Keller *et al*. 1982, 1983, 1986, 1992; McLeod *et al*. 1992) examined depressed patients when first ill and then, at a fixed time interval later, only recording those who had recovered. Thirdly, in most studies, predictors for TTR were measured at the time of entry into the study or during an early period of remission, thereby potentially confounding these measures with the severity of the initial depression or the completeness of the subsequent remission. Fourthly, with a few important exceptions (e.g. Weissman *et al*. 1978; Keitner *et al*. 1992; McLeod *et al*. 1992; Karp *et al*. 1993), most studies examined only one or a small number of potential predictor variables at a time. Finally, previous measures of 'genetic risk', were diagnostically non-specific, based on family history data, and/or performed in intact

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families, thereby confounding the impact of genetic and familial–environmental factors. The present study of TTR from MD attempts to address these methodological limitations.

METHOD

Sample and predictor variables

Twins in this study were obtained from the Virginia Twin Registry, formed from a systematic review of public birth records in the Commonwealth of Virginia (Kendler *et al.* 1992*a*). Twins participated in three waves of contact, separated by at least 1 year. The first was a response to at least one of two mailed questionnaires. Of the 2352 individuals from pairs in which both members replied, we completed personal interviews on 2163 in the second wave of assessment. In the third wave, 2002 twins were successfully interviewed by telephone. All interviews were conducted by mental health professionals (Kendler *et al.* 1992*a*).

In both wave 2 and wave 3 interviews, all respondents were asked whether, in the last 12 months, they had experienced any of 20 individual psychiatric symptoms for 5 days or more, including all of the DSM-III-R (American Psychiatric Association, 1987) 'A' criteria for MD. Symptoms were counted if judged not to result from medication or physical illness.

We utilized two diagnostic constructs in these analyses applied by computer algorithm: full and symptomatic DSM-III-R criteria for MD. While both constructs required the individual to report five or more of the nine 'A criteria', the full criteria required a minimum duration of symptoms of 2 weeks, while the symptomatic

Table 1. *Variables included in each domain*

Prior life events
- Number of deaths (6)
- Number of illnesses (7)
- Number of crises (7)
- Victim (2)
- Interpersonal differences (9)
- Financial trouble (1)
- Personal illness or injury (2)
- Legal problems (1)
- Housing problems (2)

Lifetime trauma
- Sexual assault/rape (1)
- Other physical assault (1)
- Life-threatening accident (1)
- Life-threatening illness (1)
- Unexpected death (1)
- Abortion (1)
- Broken engagement/separation (1)
- Miscarriage (1)
- Illness of relative (1)
- Property loss (1)

Family of origin
- Parental warmth (6)
- Parental protectiveness (8)
- Separation from parents (1)

Difficulties
- Interpersonal* (10)
- Financial* (4)
- Health* (1)

Miscellaneous
- Education* (2)
- Income* (1)
- Health* (1)
- Number of drinks (21)‡
- History of previous depression (2)

Social support
- Support of relatives (12)
- Support of friends (4)
- Frequency of contact w/friends (1)
- Frequency of contact w/relatives (1)
- Frequency of religious attendance (1)
- Frequency of club attendance (1)
- Confiding relationship (1)

Symptoms
- SCL-anxiety (8)
- SCL-somatic (5)
- SCL-depression (13)
- SCL-obsessive compulsive (5)
- SCL-phobic anxiety (6)
- Insomnia (3)
- SCL-eating difficulties (2)
- CESD-depression (20)

Personality and coping
- Extraversion (8)
- Neuroticism (12)
- Dispositional optimism (5)
- Self-esteem (10)
- Mastery (8)
- Interpersonal dependence (10)
- Coping by:
  - 'turning to others' (4)
  - 'problem solving' (5)
  - 'denial' (4)

Life events (*month of depression*)
- Number of total events† (54)
- Number of severe events† (28)
- Number of not-severe events† (26)

Genetics
- Genetic risk§

* Assessed at wave 2.
† Assessed at wave 2 and/or wave 3.
‡ Consisted of number of drinks of beer, wine or liquor over preceding 7 days.
§ Assessed from history of major depression in co-twin.

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criteria did not. That is, the symptomatic criteria included cases where the symptoms required for DSM-III-R MD were present from 5 to 13 days.

Twins reporting depressive episodes in the last year were asked the start and end month of each episode and the duration of the longest episode. If subject reported episodes of MD at both the second and third waves, the longer of the two episodes was analysed. An episode of MD occurring between 1 month before and 3 months after the death of a parent, spouse, sibling or child was assumed to be normal grief and excluded from analysis. Individuals reporting an episode of MD extending into the month of interview were divided into those who were recovered or still in episode.

The results reported here are based on the subset of twins who: (1) completed one of our wave 1 questionnaires; (2) had known zygosity; (3) were members of complete twin pairs; (4) met symptomatic DSM-III-R criteria at some point in the wave 2 or wave 3 ascertainment periods; and (4) for whom this episode both began during the ascertainment period and at least 1 month after the completion of the questionnaire. Of the 294 individuals who met these criteria, 155 came from monozygotic and 139 from dizygotic pairs. The mean and median number of months between waves 1 and 2 and between waves 2 and 3 were $14{\cdot}0 \pm 3{\cdot}8$ (median $= 12{\cdot}8$) and $17{\cdot}1 \pm 3{\cdot}0$ (median $= 17{\cdot}1$), respectively. For those individuals meeting full DSM-III-R criteria ($N = 235$) these values are $14{\cdot}3 \pm 4{\cdot}0$ (median $= 12{\cdot}8$) and $16{\cdot}0 \pm 2{\cdot}9$ (median $= 16{\cdot}9$) with 126 MZ twins and 109 DZ twins.

We conducted an exploratory analysis of a wide range of potential predictor variables, which we categorized into 10 *a priori* groups (Table 1). All variables except those noted in Table 1 were collected prospectively, prior to onset of the index episode. Seven personality constructs were assessed – extraversion and neuroticism, chosen by factor analysis of the full Eysenck Personality Questionnaire (Eysenck & Eysenck, 1975) and subsets of the items for dispositional optimism (Scheier & Carver, 1985), self-esteem (Rosenberg, 1965), mastery (Pearlin & Schooler, 1978), and interpersonal dependency (Hirschfeld *et al.* 1977). We measured three coping styles/mechanisms, assessed as described by Folkman & Lazarus (1980) – problem solving, denial and turning to others.

The 'family' domain included maternal and paternal care and protectiveness as assessed by items from the Parental Bonding Instrument (Parker, 1979). Scores were averaged over mother and father. Childhood parental loss was defined as separation from the biological mother or father for at least 1 year before the age of 17 that was not part of expected military duty, business travel, etc. (Kendler *et al.* 1992*b*).

Seven dimensions of social support were assessed, including constructs of perceived support, objective support, and social integration (Kessler & McLeod, 1985; Kessler *et al.* 1992). Recent difficulties were sums of scores on scales reflecting interpersonal difficulties with friends and relatives, financial difficulties and health problems.

The 'symptom' domain included scores for seven a priori scales derived from the Symptom CheckList-90 (SCL-90) (Derogatis *et al.* 1973): anxiety, somatic, depression, obsessive compulsive, phobic anxiety, insomnia and eating. This domain also included a summed score for depression from the CES-D scale (Radloff, 1977).

The miscellaneous domain included measures of education and income level, general health, number of alcoholic beverages consumed in a week, and an assessment of previous episodes of major depression at the wave 1 questionnaire. A prior lifetime major depression episode was defined as the occurrence of at least three of five key depressive symptoms for at least 2 weeks.

The number of life events occurring in the month of onset of the depressive episode is the sum of 11 categories of life events assessed at the wave 2 and wave 3 interviews (Kendler *et al.* 1995). Severe events were those which predicted an onset of MD in the month of their occurrence with an odds ratio of greater than ten (Kendler *et al.* 1995). We examined SLEs in the month of onset because prior analyses in this sample (Kendler *et al.* 1995) indicated that SLEs increased risk for onset of MD only in the month of their occurrence.

A twin's genetic liability to major depression was assessed by the co-twin's lifetime history of MD. A variable was created with a value of $-1{\cdot}0$ for monozygotic twins whose co-twin had no history of MD, $-0{\cdot}5$ for dizygotic twins

whose co-twin had no history of MD, 0·5 for dizygotic twins whose co-twin had a history of MD, and 1·0 for monozygotic twins whose co-twin had a history of MD (Sham *et al.* 1994; Kendler *et al.* 1995).

Statistical method

We began by testing the association between predictor variables and the duration of the longest full depressive episode in the prior year using the Cox proportional hazards model as operationalized in SAS procedure PHREG (SAS Institute, 1990). This model allows an unspecified form for the baseline hazard function on which the covariates act multiplicatively. Individuals who do not recover from their depressive episodes are 'right censored'. This approach requires onset of the depressive episode in the year prior to interview. However, 18 twins in our sample reported being in a chronic depressive episode at the beginning of the ascertainment period. These 'left-censored' cases were not included in our main analyses. However, since this group may be of significance in understanding predictors of TTR in MD, we also carried out parallel analyses including these cases. In these analyses, we could examine all potential predictor variables except life events in the month of onset, since the month of onset was not within the ascertainment period of the study.

Because we were interested in examining many predictor variables, a 'screening' method was needed to select potentially significant predictors for further analysis. For this first screening step we conducted a stepwise multiple Cox regression for all variables in one domain. All variables that were significant in the stepwise domain analyses were then compiled in a final multivariate Cox analysis. Age and zygosity were retained in all models as control variables. For those variables measured as a scale score, relative risks are presented as adjusted per standard deviation unit. A relative risk of less than or greater than unity means that the variable predicts a lower hazard rate (slower recovery) and a higher hazard rate (faster recovery), respectively.

The Cox proportional hazards model assumes that the magnitude of the effects of predictor variables is constant over time. Since it is not possible to fit a Cox model that allows for a covariate to have nonlinear effects on the outcome over time without explicitly specifying the nonlinear form, the sample was split at the median point of episode duration and separate analyses run on the 'early' and 'late' phases of depressive episodes. For these analyses, we used all cases meeting symptomatic DSM-III-R criteria. For the early time period, all observations were used. But those durations that were greater than the median were censored at the median duration. In the analysis of the late phases of depressive episodes, all those who had recovered by the median duration were dropped out of the analyses.

These analyses are exploratory and not confirmatory. We accept the possibility of falsely rejecting the null hypothesis in order to maximize the possibility of detecting true effects and, therefore, make no correction for multiple testing. To partly offset this liberal approach, we conservatively report all *P* values two-tailed despite a number of clear directional *a priori* hypotheses (e.g. social support hastens while genetic loading slows recovery). For the initial domain specific stepwise analyses, we set our alpha level at 5% (two-tailed), but report as 'statistical trends', and carry forward to the final analysis, variables significant at the 10% level (two-tailed). For the final multivariate analysis, however, we accept as significant, *P* values of 10% or less.

RESULTS

As seen in Fig. 1, the median and mean TTR was 42 and 82 days, respectively in the 235 twins reporting episodes meeting full DSM-III-R criteria for MD. Twenty-five and 75% of the sample had recovered by 21 and 90 days, respectively. Only 2·2% of the sample had not recovered at the end of 1 year's observation.

When we performed a separate stepwise Cox regression within each domain, only 3 variables, all related to the occurrence of SLEs in the month of onset, significantly predicted TTR from MD (Table 2). Three other variables (financial difficulties, obsessive–compulsive symptoms, and genetic risk) were predictors of TTR at the trend level. When these six variables were entered into a multivariate Cox model, three remained significant: severe SLEs, non-severe SLEs and genetic risk. Severe SLEs was the strongest predictor variable, reducing the

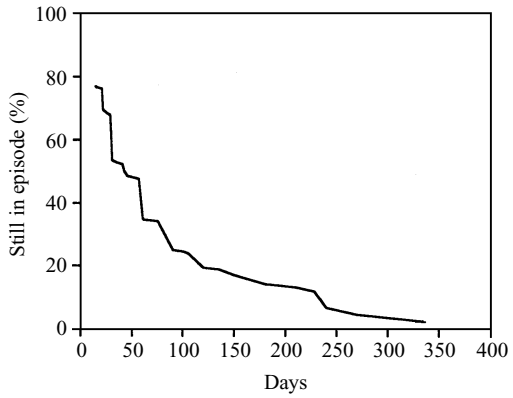

FIG. 1. The cumulative probability of remaining in an episode of major depression, meeting DSM-III-R criteria, as a function of the days since reported onset in 235 epidemiologically sampled female twins, reporting an onset of a depressive episode within 1 year of the time of interview. The curve starts at 14 days, since that is the minimum duration required by DSM-III-R for an episode of major depression.

relative risk of recovery 43%. This model predicts that the relative risk of recovery from an episode of MD is 28% lower in those at highest genetic risk to MD (MZ twins with co-twin affected with lifetime MD) compared to those at lowest genetic risk (MZ twin with co-twin unaffected).

To examine whether the impact of predictors on TTR was constant across the course of a depressive episode, we examined all 294 individuals meeting symptomatic DSM-III-R criteria for MD. We divided this sample at the median duration of their episode (28 days), examining separately predictors of TTR for early (5–28 days) *v.* late (> 28 days) in the depressive episode.

As seen in Table 3, a different pattern of predictors emerged. Early in depressive episodes, 5 variables significantly predicted TTR in the domain specific analyses (RR^1 in Table 3). A slower TTR was significantly associated with: (i) low family income; (ii) high parental protectiveness; (iii) parental separation; (iv) high levels of neuroticism; and (v) severe SLEs in the month of onset. At the trend level, slow TTR early in depressive episodes was predicted by low levels of mastery and a history of prior lifetime traumas. A number of the effects were relatively large. For example, one standard deviation (S.D.) elevation in neuroticism was associated with a 21% and a history of parental separation with a 38% lowering in the relative risk of recovery for MD.

When these eight variables were placed in a multivariate Cox regression (RR^2), all but two (extraversion and lifetime traumas) remained significant, with little change in the strength of their relationship with TTR. The one exception was mastery. In the final multivariate analysis, one S.D. elevation in the level of mastery was associated with a 31% increased relative risk of recovery.

In the stepwise domain analyses, four variables significantly predicted TTR late in depressive episodes. As was seen early in depressive

Table 2. *Predictors of time to recovery from major depression, defined by DSM-III-R*†

Domain	Variable	RR^1	RR^2
Difficulties	Financial‡	0·88*	—
Prior life events	—	—	—
Miscellaneous	—	—	—
Family	—	—	—
Personality and coping	—	—	—
Social support	—	—	—
Symptoms	Obs–comp‡	0·87*	—
Traumas	—	—	—
Life events in month of depression onset	Number of events	0·68***	—
	Severe events	0·57***	0·57***
	Non-severe events	0·78**	0·78**
Genetic	Genetic risk	0·85*	0·85*

* $P < 0{\cdot}10$; ** $P < 0{\cdot}05$; *** $P < 0{\cdot}001$.
† $N = 235$.
‡ Relative risk adjusted per standard deviation.
RR = Relative risk.
RR^1 Results from domain analyses.
RR^2 Results from multivariate analyses.

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Table 3. *Predictors of time to recovery in individuals meeting symptomatic DSM-III-R criteria for major depression early* versus *later in the depressive episode*

Domain	Predictor variables	⩽ 28 days $N = 294$			> 28 days $N = 152$		
		RR^1	RR^2	RR^3	RR^1	RR^2	RR^3
Difficulties	—	—	—	—	—	—	—
Previous life events	—	—	—	—	—	—	—
Miscellaneous	Income†	1·19**	1·22**	1·23*	—	—	0·85
	Health†	—	—	0·99	0·83*	—	0·82*
Family	Protectiveness†	0·79**	0·79***	0·80**	—	—	1·05
	Separation†	0·62**	0·58**	0·79**	—	—	1·01
Personality and coping	Extraversion†	0·84*	—	0·79	—	—	0·93
	Neuroticism†	0·79**	0·79**	0·79*	—	—	0·98
	Mastery†	1·18*	1·31**	1·34***	—	—	1·10
Social	Frequency of contact with relatives†	—	—	0·97	1·23**	1·28**	1·24**
	Frequency of attendance at clubs†	—	—	0·97	1·25**	—	1·19
Symptoms	Obsessive/ compulsive†	—	—	0·98	0·84*	—	0·92
Trauma	Trauma	0·69*	—	0·81	—	—	0·97
Life events	Severe	0·62**	0·63**	0·65**	0·52****	0·46****	0·45****
	Not severe	—	—	0·84	0·77*	0·76*	0·78
Genes	Genetic risk	—	—	1·08	0·75**	0·80*	0·81

* $P < 0·10$; ** $P < 0·05$; *** $P < 0·01$; **** $P < 0·001$.

RR, Relative risk. † Relative risk adjusted per standard deviation; RR^1, Results from domain analyses; RR^2, Results from multivariate analyses; RR^3, Multivariate analysis including all variables that were predictive either early (⩽ 28 day) and/or late (> 28 days) in depressive episodes.

episodes, severe SLEs also predict TTR late in the later phases of depression. Frequency of contact with relatives and with clubs both significantly predicted a faster TTR late in depressive episodes. The fourth significant predictor was genetic risk with those at highest risk now predicted to have a 44% reduced relative risk of recovery compared to those at lowest risk. Three variables were associated, at trend levels, with slower TTR late in depressive episodes: poor physical health, obsessive compulsive symptoms and non-severe SLEs.

Of these seven variables, only four remained significant in the final multivariate model: (i) frequency of contact with relatives; (ii) severe SLEs; (iii) non-severe SLEs; and (iv) genetic risk. Of note is the quite strong effect of severe SLEs in the month of onset – associated with a 54% reduction in the relative risk of recovery late in depressive episodes.

We also performed a multivariate analysis containing all items which predicted TTR either early or late in the depressive episode (RR^3 in Table 3). Results were generally similar to those seen previously, but now allow a direct comparison of the predictive power of the variables on recovery at different phases of the depressive illness. Finally, we examined the significance of different predictors early *v.* later in depressive episodes. All cases were pooled and a Cox regression fit which included an interaction term between the predictor and an indicator variable for time period. Using this model, we found that the following variables differed significantly (at $P < 0·05$, or with * if $P < 0·10$) in predicting TTR early *v.* late in depressive episodes; income*, protectiveness, extraversion*, contact with relatives, attendance at clubs and genetic risk.

Our sample included 18 twins with chronic depressive episodes whose onset occurred prior to our 1-year period of assessment. All analyses were repeated including these cases (details available on request). The major difference was the emergence of two new significant predictors in the multivariate analysis: neuroticism predicting prolonged and dispositional optimism predicting shortened TTR (RR = 0·83 and 1·25, respectively). We also re-ran the analyses of predictors of TTR early and late in depressive

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episodes including these chronic cases. One noteworthy change was seen. With the inclusion of chronic cases, the predictive power of genetic risk on slow TTR late in depressive episodes increased considerably.

DISCUSSION

Time to recovery of major depression in an epidemiological sample

In an epidemiological sample of women, we found that MD, defined by the full DSM-III-R criteria, was a self-limiting condition. For episodes beginning in the last year, the median time to recovery was 6 weeks and over 97% of cases recovered within a year. In another general population sample, McLeod *et al.* found that 40% of major depressive episodes recovered by 5 weeks and over 90% by 1 year (McLeod *et al.* 1992). These results are, however, quite different from those obtained in clinical samples, which report considerably slower recovery and a higher proportion of unrecovered cases (Robins & Guze, 1972; Keller *et al.* 1986).

However, our results are influenced by the exclusion from our sample of episodes with an onset prior to the last 12 months. Even though the number of such cases in our sample was small (7·1% of all reported depressions), their inclusion slowed down the TTR in the entire cohort (from a median of 42 to 56 days) and more than tripled the proportion unrecovered by the end of the year. Consistent with previous studies (Keller *et al.* 1984, 1986, 1992), this suggests that prior chronicity is a strong predictor of slow TTR. Nonetheless, even with the inclusion of these chronic cases, the speed of recovery from MD is much faster in this sample than in previous clinical populations (Robins & Guze, 1972; Keller *et al.* 1982, 1986).

Prospective predictors of TTR

Stressful life events

SLEs were the most consistent and robust predictors of TTR from MD in our sample. The occurrence of both non-severe, and especially severe, SLEs prior to onset strongly predicted a slow TTR. Although contrary to the clinical construct of a good-prognosis 'reactive depression', these results are consistent with findings from most (Krantz & Moos, 1988; Monroe *et al.* 1992; Karp *et al.* 1993), but not all prior studies (Weissman *et al.* 1978; Parker *et al.* 1988).

Little is known about the mechanism of action of SLEs on TTR for MD. Given the strength of the effect seen here, understanding the nature of this relationship might be of considerable clinical significance. While SLEs may directly impact on TTR, it is also plausible that they could retard the recovery process by recurring during the episode, causing entrapment in conflictual situations or precipitating difficulties (Brown & Moran, 1994; Brown *et al.* 1995).

Social support

Most (Brown *et al.* 1988; Krantz & Moos, 1988; Brugha *et al.* 1990; McLeod *et al.* 1992; Nuss & Zubenko, 1992; Karp *et al.* 1993), but not all (Huxley *et al.* 1979; Parker *et al.* 1988), prior studies have found that social support shortens the length of depressive episodes. We found only a modest effect for social support in our sample, and only later in the course of depressive episodes. Our study differed from most previous investigations in utilizing measures of social support obtained a year or more prior to the index evaluation. Thus, our assessment of social support was less likely to be contaminated by antecedents or sequelae of the depressive episode.

We found significant effects on TTR only for measures reflecting 'objective' aspects of social support (frequency of contact with friends and clubs), not subjective measures of the 'quality/adequacy' of support. By contrast, previous analyses in this sample showed that perceived support was more strongly correlated with current levels of depressive symptoms than measures of the frequency of contact (Kessler *et al.* 1992).

Our results, however, are not inconsistent with previous findings from studies that have looked at a range of social support measures. In their study of the impact of social support on recovery from MD, Brugha *et al.* (1990) also noted that in women, size and frequency of contact with the social network were stronger predictors than perceived adequacy. Karp *et al.* (1993) found that only 'tangible' support, rather than support in the domains of belonging and self-esteem, predicted recovery from MD. This pattern of results might occur because: (i) individuals can be rather poor at predicting who

will provide them emotional support in the time of stress (Brown *et al.* 1986); (ii) 'routine' social support may correlate poorly with support received during a depressive episode; or (iii) many attempts at emotional support provided by significant others during depressive episodes miscarry (Coyne *et al.* 1988).

We know of no precedent to our finding that measures of social support impact only late in depressive episodes. The only partly comparable analyses of which we are aware were reported by McLeod *et al.* (1992). Their multiple measures reflected the more 'subjective' aspects of social support, and the one significant effect they found in subgroups divided by duration was spouse conflict impacting on TTR only late in the depressive episode (14–52 weeks).

Personality

A number of studies have found that personality impacts on outcome in MD (Weissman *et al.* 1978; Brugha *et al.* 1990; Duggan *et al.* 1990; Keitner *et al.* 1992). Our analyses, supporting the importance of neuroticism – a general personality measure of 'negative emotionality' – replicate these results. In the original sample, neuroticism only predicted TTR in the early phases of a depressive episode. However, when the chronic cases were included, neuroticism became a significant predictor for all DSM-III-R episodes.

Less expected were the findings that, controlling for levels of neuroticism, two different 'personality-like' measures of mastery (Pearlin & Schooler, 1978) and optimism (Scheier & Carver, 1985) predicted speed of recovery from MD. A representative item from these two scales is, respectively, 'I can do just about anything I really set my mind to' and 'I always look on the bright side of things'. Kobasa *et al.* (1981) have written of the importance of an 'optimistic cognitive appraisal' and a 'hardy personality style' in developing a health promoting approach to adversity. Their concept – that certain individuals approach adversity with confidence in their abilities, seeing such experiences as a positive challenge and life enriching – may be directly applicable to strategies for successfully coping with major depression. Of note, optimism has been previously shown to predict good outcome in response to bereavement (Shanfield, 1981).

Early family functioning

Although our results reinforce prior studies suggesting the importance of early family functioning in TTR from MD (Gotlib *et al.* 1988; Parker *et al.* 1988; Brown & Moran, 1994; Brown *et al.* 1994), the exact nature of this effect remains unclear. We find that separation from parents before the age of 17 and high levels of perceived parental protectiveness both significantly increase TTR, but only in the early stages of the recovery process. We found no predictive effect of perceived parental warmth. Of the three studies that have examined these predictors, one (Gotlib *et al.* 1988) reports a significant effect for parental warmth but not for protectiveness, another finds reduced rates of recovery in those who report parents to have had both low warmth and high protectiveness (Parker *et al.* 1988) and a third finds no effect of parental loss in childhood on rates of recovery (Weissman *et al.* 1978). Broadly consistent with our results, Brown *et al.* recently found, in both epidemiological (Brown & Moran, 1994) and clinical samples (Brown *et al.* 1994), that childhood adversity (broadly defined as sexual abuse, physical abuse or parental indifference) predicts chronicity in depressive disorders.

Difficulties

Two measures of financial status significantly predicted TTR from MD in our sample. Financial difficulties represented a modest predictor of slow TTR in all DSM-III-R cases, and a considerably stronger predictor when the chronic cases were included. In addition, high levels of family income predicted recovery early in the depressive episode. These results are consistent with results from a number of prior studies where various measures of low socio-economic status predicted longer episode duration in MD (Huxley *et al.* 1979; Keller *et al.* 1984, 1986; McLeod *et al.* 1992).

Current health difficulties weakly predicted slow TTR in our sample, but only later in depressive episodes. These results are partially congruent with previous studies that have suggested that medical problems predict poor overall outcome in depressive illness (Krantz & Moos, 1988; Keitner *et al.* 1992). Surprisingly, in contrast to recent findings by Brown *et al.* (Brown & Moran, 1994; Brown *et al.* 1994), we

did not find that interpersonal difficulties influenced TTR.

Symptoms and prior history

Prospectively assessed psychiatric symptoms were relatively poor predictors of TTR, the only dimension reaching significance being obsessive–compulsive symptoms. This finding is consistent with the one previous empirical examination of this issue of which we are aware (Duggan *et al.* 1990) as well as a long clinical tradition that has related obsessive–compulsive symptoms and traits to depression generally and to poor outcome depression more specifically (Lewis, 1934; Tellenbach, 1980). Contrary to most (Krantz & Moos, 1988; Sargeant *et al.* 1990; Keitner *et al.* 1992), but not all reports (Weissman *et al.* 1978; Keller *et al.* 1986), we found no evidence that a prior history of MD influenced the TTR of depressive episodes experienced in the last year.

Genetic risk

Given the strong evidence of the role of genetic factors in the aetiology of depression (Tsuang & Faraone, 1990), surprisingly few studies have assessed the influence of genetic or familial risk factors on TTR in MD. One study reports no relationship with recovery from MD and a family history of psychiatric illness (Keitner *et al.* 1992). A study of widows (Nuss & Zubenko, 1992), found that a family psychiatric history weakly predicted persistent depressive symptoms. A further study (Huxley *et al.* 1979), found that familial risk for broadly defined affective disorder predicted slow recovery from mild depressive and anxiety disorders.

In our twin sample, which allowed us to disentangle the effect of genetic and familial–environmental factors, we were able to see a consistent albeit modest effect of genetic risk for MD on TTR. This effect was stronger in the later phases of a depressive episode and became particularly robust when chronic cases of MD were included. These results suggest that the genetic/biological systems that influence the vulnerability to onset and TTR of MD have elements in common.

Early versus *late recovery from major depression*

We found considerable differences in the factors that influenced TTR early *v.* late in the depressive episode. These results call into question findings from the entire sample, as they suggest that an assumption of the Cox Proportional Hazard model – that risk factors impact similarly at different points in the survival process – may be incorrect. Only the occurrence of severe SLEs in the month of onset was a strong and consistent predictor of slow recovery throughout the depressive episode.

We are aware of only one prior study which examined predictors of TTR from MD as a function of length of episode (McLeod *et al.* 1992). Unfortunately, the set of predictors was too divergent to directly compare with the current findings. However, like our result, McLeod *et al.* found evidence for different predictors impacting on different phases of the recovery process.

While these results should be replicated prior to serving as the basis for extensive speculation, they do suggest that recovery from depressive episodes is unlikely to be a unitary process. Rather, these findings suggest that different factors impinge on the recovery process at different points in time.

Limitations

These results should be interpreted in the context of five potential methodological limitations. First, the sample is entirely female. Given previous evidence of gender differences in TTR (Sargeant *et al.* 1990) and predictors of TTR from MD (Brugha *et al.* 1990), the results obtained here cannot be assumed to extrapolate to men. Secondly, this was a naturalistic, epidemiological study and we were unable to control for treatment effects.

Thirdly, we did not include all possible predictors of TTR, particularly clinical features of the depression itself or co-morbidity. Our emphasis on prospective predictors leads us to exclude features of the depressive episode. We examined the effect of lifetime co-morbidity in this sample and it was surprisingly weak (the strongest effect, $P = 0{\cdot}06$, being found for lifetime generalized anxiety disorder).

Fourthly, a small proportion of our predictor measures were not prospectively assessed. The few that were not, however, could mostly be divided into those that are relatively immutable, such as educational attainment or lifetime

history of MD in co-twin, and those that assessed events occurring in the last year immediately prior to the depressive onset (SLEs) that would be difficult to measure prospectively.

Fifthly, we examined a large number of possible predictor variables. Although those variables which significantly predicted TTR in our study had nearly all been previously reported to affect depressive outcome, it remains possible that some of these findings are false positives, and occurred solely because so many variables were examined.

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