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Assessing subjective sleep reports in the first-degree relatives of antidepressant-treated depressed outpatients

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This study sought to investigate whether first-degree relatives of depressed patients report, and react to, sleep perceptions in the same way as the depressed group. Our previous research suggested that depressed individuals may experience greater sleep 'distress' than healthy individuals; we wished to explore whether this was also apparent in their nearest relatives. A sample was recruited of 18 antidepressant-treated patients with a current DSM-IV diagnosis of major depressive disorder, 18 healthy controls, and a group of 10 first-degree relatives for each study group. In accordance with previous findings, poorer sleep perceptions corresponded with poorer life-quality and mood perceptions, and depressed individuals reported poorer sleep perceptions and poorer life-quality/mood perceptions than controls. Additionally, there was evidence of similar sleep reporting between depressed patients and their relatives, and for a difference between these relatives and other non-depressed groups. There was a non-significant trend for depressed patients, and their relatives, to report total sleep time in the same manner as each other, and differently to other non-depressed groups. Reports of poor sleep may be associated with reports of poor mood in depression, but in non-depressed individuals the association may be with a feeling of weariness.

KEY WORDS — subjective sleep quality; depression; first-degree relatives

INTRODUCTION

Previous research regarding the relationship between disturbed sleep and depression has focused primarily on objective measures of sleep, such as electroencephalography (EEG); however, relatively few studies have examined subjective factors of sleep perception in depression. Research has shown a strong relationship between insomnia and depression (Breslau *et al*., 1996; Ford and Kamerow, 1989). In our previous study (Mayers *et al.*, 2003) it was found that subjective estimates of sleep are as important as objective measures when examining these factors in depression, particularly in respect of sleep distress. Those results demonstrated that perceptions from a sleep diary were significantly related to reports of mood and life quality on a questionnaire, when conducted on a depressed patient sample and a healthy control group. A particular focus of previous researchers has been to identify an aspect of sleep disruption that might represent a risk marker for developing depression. Some research has indicated that certain sleep patterns apparent in depressed individuals, which are also present in their non-depressed first-degree relatives, may signal this risk (Giles *et al.*, 1989, 1998) . However, most of this research has been restricted to objective factors. The current study focused on subjective estimates of sleep.

In a meta-analysis of 177 objectively measured sleep studies in psychiatric disorders, depressed patients consistently demonstrated shorter sleep time, longer sleep latency, less slow-wave sleep, shorter REM sleep latency and greater REM density than controls (Benca *et al.*, 1992). The degree of REM sleep variation appears to be the factor most associated with depression (Kupfer, 1995). Alterations in REM sleep

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latency, and the temporal distribution of REM sleep and slow-wave sleep, may represent a risk factor for developing depression (Giles *et al.*, 1989) but it would be useful to also identify a marker in subjective sleep reporting that might indicate risk of depression. EEG facilities are rare and expensive, so it may save time and money if clinicians were able to recognise this subjective marker, particularly in primary care. In our previous study (Mayers *et al.*, 2003) a combination of sleep diaries and life-quality questionnaires was used to examine how depressed individuals and healthy controls present sleep distress; this technique was used here on a depressed group and a non-depressed control group, and first-degree relatives of those groups. If those more prone to depression, such as first-degree relatives, report sleep distress in much the same way as those already depressed, but not in similar way to those not depressed, then the sleep reports may represent a marker for depression. If these markers are subsequently identified in a non-depressed individual they could be considered a potential risk factor for depression.

Fichten and colleagues (Alapin *et al.*, 2001) have reported a negative association between increased levels of sleep distress and daytime function. It was shown that this may be particularly pronounced in depressed individuals (Mayers *et al.*, 2003). The aim of the current study was to explore how much sleep distress is observed in relatives of depressed patients. Sleep disturbances (Linkowski *et al.*, 1989; Partinen *et al.*, 1983; Webb and Campbell, 1983) and depression (Allen, 1976; Cadoret, 1978; Kendler *et al.*, 1993; Mendlewicz and Rainer, 1977) may have a genetic influence. Consequently, non-depressed relatives of depressed individuals, already at risk of developing depression, may be more at risk if they exhibit a particular sleep disturbance associated with depression. Giles and her colleagues (Giles *et al.*, 1989, 1998) have established a significant relationship between depressed individuals and their non-depressed first-degree relatives with respect to REM sleep latency, which may represent an important marker in establishing a risk factor for depression. This study sought to examine whether subjective perceptions of sleep might distinguish depressed patients from controls; and to investigate aspects of sleep perception in depressed patients, their non-depressed first-degree relatives and healthy controls.

Our hypotheses were: (1) poorer reports of sleep on the diary would lead to poorer reports of life-quality and mood on the questionnaire; (2) the depressed group would report poorer perceptions of sleep on the diary than controls and their relatives and poorer perceptions of life quality and mood on the questionnaire than all other groups; (3) the relatives of the depressed group would report similar sleep disturbance to the depressed group, but would differ to the control group and their relatives. There would be no such similarity between the control group and their first-degree relatives.

METHOD

Participants

Eighteen depressed patients were recruited from among current psychiatric outpatients within the Mood Disorders Service in Southampton (UK).[1] The patients had received a DSM-IV diagnosis of major depressive disorder from their consultant psychiatrist. All 18 depressed patients were taking psychotropic drugs; four patients were receiving selective serotonin reuptake inhibitors (SSRI: two were taking paroxetine, one sertraline, one citalopram), ten were receiving newer antidepressants (five mirtazapine, four venlafaxine, one reboxetine), one was receiving a tricyclic antidepressant (clomipramine); one patient was receiving a new antidepressant augmented with a novel antipsychotic (venlafaxine and risperidone), and one patient was receiving a combination of two new antidepressants (mirtazapine and reboxetine). At the time of this investigation one further patient was entered into a double-blind randomised-controlled trial of reboxetine vs paroxetine, which was subsequently revealed to be the latter. Only one of the patients was receiving treatment with a hypnotic (diazepam in combination with flupentixol). Eighteen healthy controls, matched for age and gender, were also recruited; only those without a history, or family history, of depression were included. Ten first-degree relatives of the depressed group (with no personal history of depression) and 10 first-degree relatives of the control group were also recruited all of whom were siblings (with no history, or family history, of depression). Data regarding age and gender of these groups are presented in Table 1.

Materials

The sleep diary was based on the Pittsburgh sleep diary (Monk *et al.*, 1994), amended to fit the aims of this

[1]Ethical approval had been granted, in accordance with the Declaration of Helsinki, to conduct the investigation by the Southampton and South West Hants Local Research Ethics Committee (Submission 037/99).

Table 1. Age and gender details of study groups

Group	*n*	Gender		Age			
		Male	Female	Mean	(SD)	Min	Max
Depressed	18	7	11	44.89	(11.66)	28	65
Control	18	7	11	44.17	(10.80)	26	60
Relatives of depressed	10	4	6	42.80	(12.44)	22	62
Relatives of controls	10	3	7	41.80	(13.42)	22	65
Total	56	21	35	43.73	(11.59)		

study; several questions were removed, relating to prior daytime food consumption, caffeine, tobacco and alcohol intake, drugs and medications, exercise and naps. The first four questions referred to participants' estimations of sleep patterns: sleep latency, the number of nocturnal awakenings (WASO), the length of these (WMINS), and total sleep time (TST). Responses in this section were expressed in terms of minutes. The second section of six items related to participants' sleep evaluations: overall sleep quality (SQUAL), the ease of sleep initiation (EASE), the quality of sleep in the first quarter of the sleep episode (SQF), and the last quarter (SQL), restfulness on waking (Rested) and whether the sleep episode was sufficient (Enough).

The life-quality questionnaire, was based on the quality of life of insomniacs (QOLI) questionnaire (Pires de Souza, 1996; Rombaut *et al.*, 1990), and contained 38 questions, which elicit responses regarding mood, daytime functioning, somatic complaints and relationships. A Beck depression inventory (BDI) (Beck *et al.*, 1961) was used to examine the self-rated severity of depression. A clinical global impression (CGI) scale (Guy, 1976) was used to assess overall severity of illness. The structured interview guide for the Hamilton depression and anxiety scales (SIGH-AD) (Williams, 1990) was used to assess the severity of depressive and anxiety symptoms. The BDI, CGI and SIGH-AD were used to examine the relationship between severity of depression and subjective sleep reports, and will be reported elsewhere.

Procedure

Upon consent the patients were interviewed using the CGI and SIGH-AD. The patients completed the BDI, and were given the sleep diaries and questionnaires to complete at home. The control group was invited to participate through a series of advertisements and e-mail notices. To qualify for inclusion, control participants had to declare that they had no history, or family history, of depression. They then completed the BDI and were given the diaries and questionnaires to complete at home. Participants from the patient and control groups were asked to nominate a brother and/or sister (not obligatory), with no history of depressive illness, who might agree to participate. These relatives were contacted and, upon consent, completed the BDI before being given the diaries and questionnaires to complete at home. All participants were instructed to complete one sleep diary each morning for 2 weeks before completing the questionnaire. The scoring procedure for the diary and questionnaire are reported elsewhere (Mayers *et al.*, 2003).

RESULTS

Diary and questionnaire responses between the groups

Table 2 shows that there were significant between-group differences (confirmed by ANOVA) for all categories, except for the perceived number (WASO) and length of nocturnal awakenings (WMINS), total sleep time (TST), 'late' sleep quality (SQL) and perceptions of sufficient sleep (Enough). The comparisons of individual between-group pairings were examined using independent samples *t*-tests. The depressed group reported significantly ($p < 0.001$) poorer perceptions of life-quality/mood on the questionnaire than all of the other study groups (controls, C; relatives of depressed, RD; relatives of controls, RC). The depressed group also reported significantly poorer perceptions of sleep latency (C: $p = 0.001$; RD: $p = 0.004$; RC: $p = 0.001$), ease of sleep initiation (EASE; C: $p = 0.006$; RD: $p = 0.013$; RC: $p = 0.009$) and feelings of restfulness on awakening (Rested; C: $p < 0.001$; RD: $p = 0.021$; RC: $p = 0.012$) on the sleep diary than all other study groups. Depressed individuals reported significantly poorer perceptions of overall sleep quality (SQUAL) and 'early' sleep (SQF) than the control group ($p = 0.008$; $p = 0.007$, respectively) and the 'relatives of controls' group ($p = 0.006$; $p = 0.005$). The depressed group reported significantly longer nocturnal awakenings (WMINS) than the relatives of control group ($p = 0.021$). The depressed group reported significantly poorer perceptions of 'late' sleep

Table 2. Mean scores and (standard deviation) for all categories, analysis by study group

Category		A Depressed ($n = 18$)	B Control ($n = 18$)	C Relative of Dep ($n = 10$)	D Relative of Con ($n = 10$)	Sig	Post-hoc source of significance
Diary items							
Latency		42.46 (28.54)	13.85 (10.81)	18.86 (9.69)	15.69 (8.36)	[c]	AB, AC, AD
WASO		1.62 (0.88)	1.33 (0.92)	1.53 (1.22)	1.54 (1.05)		
WMINS		44.71 (55.95)	16.79 (19.97)	29.82 (54.16)	10.32 (11.43)	[d]	[d]AB, [a]AD
TST		426.70 (112.89)	410.14 (35.49)	411.82 (57.34)	433.19 (46.81)		
SQUAL		48.13 (20.44)	29.96 (18.33)	33.62 (21.25)	30.32 (11.32)	[a]	AB, AD
EASE		45.62 (28.11)	22.41 (17.67)	25.38 (11.19)	22.38 (15.29)	[b]	AB, AC, AD
SQF		43.23 (25.64)	22.04 (17.67)	29.63 (19.79)	18.78 (16.84)	[b]	AB, AD
SQL		52.21 (21.76)	35.33 (19.41)	38.16 (19.14)	39.24 (16.95)	[d]	[a]AB
Rested		65.11 (19.97)	39.02 (17.92)	44.04 (21.69)	42.56 (20.63)	[b]	AB, AC, AD
Enough		53.85 (20.80)	36.43 (16.00)	45.45 (20.73)	44.38 (19.97)	[d]	[a]AB
Questionnaire items (max)							
Sleep	(400)	222.11 (86.96)	136.06 (94.74)	133.90 (96.55)	132.70 (78.36)	[a]	AB, AC, AD
Awake	(500)	361.33 (82.44)	197.78 (95.54)	209.10 (93.38)	214.30 (104.36)	[c]	AB, AC, AD
Physical	(1000)	628.94 (167.20)	267.56 (109.42)	271.90 (172.60)	268.40 (170.12)	[c]	AB, AC, AD
Mood	(1200)	791.11 (175.19)	355.56 (156.81)	246.00 (137.61)	297.00 (147.88)	[c]	AB, AC, AD
Relate	(700)	497.44 (127.64)	130.44 (95.75)	144.90 (147.28)	159.30 (135.61)	[c]	AB, AC, AD
Overall	(3800)	2500.94 (495.69)	1087.39 (385.45)	1005.80 (538.27)	1071.70 (573.76)	[c]	AB, AC, AD

Higher scores reflect poorer perceptions, except TST where lower scores are poorer.
Sig, between-group significance: [a]$p < 0.05$; [b]$p < 0.01$; [c]$p < 0.001$; [d]approached significance.
Latency, sleep latency (min); WASO, estimated no. of nocturnal awakenings; WMINS, estimated length of WASO (min); TST, estimation of time asleep; SQUAL, sleep quality evaluation; EASE, perceived difficulty of sleep initiation; SQF, evaluation of SQUAL in first quarter of sleep period; SQL, evaluation of SQUAL in last quarter of sleep period; Rested, perception of restfulness on waking; Enough, evaluation of whether sleep was sufficient.

(SQL; $p = 0.019$) and of satisfaction of sufficient sleep (Enough; $p = 0.008$) than the control group.

The control group, the 'relatives of controls' group and the 'relatives of depressed' group did not differ significantly to each other in respect of diary or questionnaire variables. The 'relatives of depressed' group differed to the depressed group on some sleep perceptions on the diary, which did not accord with our prediction. However, the 'relatives of depressed' group were only significantly different to the depressed group in three of the ten sleep perceptions, the fewest of any pairing with the depressed group; so in that respect they were similar, as predicted. The other two groups, controls and their relatives, were also not significantly different from the depressed group in four out of ten criteria of the sleep diary. The 'relatives of depressed' group also reported poorer, albeit non-significant, sleep perceptions than the control group and 'relatives of controls' group for all sleep diary variables except the number of awakenings and total sleep time.

Correlation

The association between diary and questionnaire variables was assessed using Pearson's correlation coefficient and is shown in Table 3. For the most part, diary items were highly correlated with each other. However, perceptions regarding the number of nocturnal awakenings (WASO) were not as highly correlated with other sleep perceptions. Questionnaire item perceptions were consistently highly correlated with each other. Perceptions concerning sleep patterns (latency, the number (WASO) and length of nocturnal awakenings (WMINS) and total sleep time (TST)) were not as highly correlated against questionnaire items as perceptions of sleep evaluation were. Perceptions of sleep latency and the length of nocturnal awakenings (WMINS) were strongly associated with questionnaire perceptions. However, perceptions of the number of nocturnal awakenings (WASO) and total sleep time (TST) were only related to perceptions of sleep on the questionnaire, and not the other perceptions of life quality and mood. These findings refer to observations of the overall study sample, and confirm the extent to which perceptions of sleep correspond with perceptions of life-quality and mood.

The correlation between sleep perceptions and life-quality was compared in the various study groups using Fisher's Z transformation (Clark-Carter, 1997). Because the study groups are relatively small, the

Table 3. Correlation of diary and questionnaire items (all participants; $n = 56$)

Diary correlation

Diary	WASO	WMINS	TST	SQUAL	EASE	SQF	SQL	Rested	Enough
Latency	0.24	0.62[c]	−0.45[b]	0.65[c]	0.82[c]	0.78[c]	0.45[b]	0.48[c]	0.48[c]
WASO		0.53[c]	−0.34[a]	0.40[b]	0.22	0.23	0.44[b]	0.29[a]	0.32[a]
WMINS			−0.48[c]	0.59[c]	0.44[b]	0.54[c]	0.56[c]	0.45[b]	0.47[c]
TST				−0.39[b]	−0.41[b]	−0.38[b]	−0.37[b]	−0.14	−0.31[a]
SQUAL					0.72[c]	0.81[c]	0.83[c]	0.78[c]	0.78[c]
EASE						0.90[c]	0.43[b]	0.52[c]	0.49[c]
SQF							0.55[c]	0.64[c]	0.63[c]
SQL								0.80[c]	0.82[c]
Rested									0.92[c]

Questionnaire correlation

Questionnaire	Awake	Physical	Mood	Relate	Overall
Sleep	0.47[c]	0.59[c]	0.46[c]	0.52[c]	0.63[c]
Awake		0.79[c]	0.70[c]	0.74[c]	0.83[c]
Physical			0.82[c]	0.89[c]	0.95[c]
Mood				0.90[c]	0.94[c]
Relate					0.96[c]

Diary vs questionnaire correlation

	Questionnaire items					
Diary items	Sleep	Awake	Physical	Mood	Relate	Overall
Sleep pattern						
Latency	0.62[c]	0.41[b]	0.55[c]	0.50[c]	0.49[c]	0.57[c]
WASO	0.62[c]	0.19	0.23	0.10	0.15	0.23
WMINS	0.56[c]	0.39[b]	0.40[b]	0.39[b]	0.31[b]	0.44[b]
TST	−0.40[b]	0.07	0.06	0.02	0.12	0.02
Sleep evaluation						
SQUAL	0.72[c]	0.62[c]	0.51[c]	0.36[b]	0.41[b]	0.53[c]
EASE	0.68[c]	0.39[b]	0.56[c]	0.39[b]	0.46[c]	0.53[c]
SQF	0.65[c]	0.48[c]	0.53[c]	0.36[b]	0.40[b]	0.51[c]
SQL	0.61[c]	0.59[c]	0.45[c]	0.36[b]	0.42[b]	0.51[c]
Rested	0.56[c]	0.80[c]	0.69[c]	0.57[c]	0.64[c]	0.71[c]
Enough	0.55[c]	0.61[c]	0.50[c]	0.37[b]	0.43[b]	0.52[c]

[a] $p < 0.05$; [b] $p < 0.01$; [c] $p < 0.001$.

significance of the results are subsequently reduced, and should be interpreted with caution. These data are too cumbersome to show fully, and only the key data are presented here, but the full results can be requested from the authors.

Depressed group vs control group and their relatives

There was a trend for depressed individuals to demonstrate stronger associations for 'total sleep time' against the other sleep diary perceptions, than in the control group ($p = 0.010$), or the 'relatives of controls' group ($p = 0.013$). This suggests that total sleep time was more important to the depressed group than these other groups, as the perception of this had a major effect on the way they regarded all other aspects of sleep. The depressed group demonstrated a weaker association between perceptions of sleep on the diary and perceptions of daytime alertness on the questionnaire than the control group, but a stronger relationship for sleep diary perceptions against mood on the questionnaire. This suggests that perceptions of poorer sleep are associated with a feeling of poorer mood for depressed people, whilst for healthy individuals poorly perceived sleep is associated with feeling weary during the day (but not depressed). The depressed group also demonstrated a weaker association between sleep evaluation responses against perceptions of

daytime alertness than the relatives of controls, but did not differ in respect of sleep evaluations against mood perceptions.

Relatives of depressed group vs controls and their relatives

The relationship between total sleep time and other sleep perceptions was also observed between the control group and 'relatives of controls' group, albeit on a reduced scale ($p = 0.09$). The trend observed here lends some support to the prediction that the relatives of depressed individuals may report sleep in much the same way as the depressed proband.

Depressed group vs relatives of depressed

The observation regarding perceptions of total sleep time against other sleep diary items seen in the previous pairings was no longer apparent. The depressed group and their siblings were similar in this respect. This suggests some support for the prediction that they would be similar in sleep reporting. Also, the way in which these sleep perceptions related to questionnaire responses did differ between the groups. The depressed group demonstrated a weaker association between sleep evaluations and perceptions of daytime alertness than their relatives. However, this observation would have been stronger still had the depressed group's perceptions of sleep been more strongly associated with mood perceptions than their relatives.

Control group vs relatives of controls

As predicted there were no discernible trends between these two groups. Differences fluctuated both in size and direction more than for any other pairing. Effectively the relatives of controls were a second control group.

DISCUSSION

The hypothesis that poorer reports of sleep on the diary would be positively related to poorer life-quality and mood reports on the questionnaire was supported. As subjective perceptions of sleep worsen, so do subjective perceptions of mood. This accorded with previous research that demonstrated that insomnia is strongly associated with depression (Breslau *et al.*, 1996; Ford and Kamerow, 1989). The results support our previous findings (Mayers *et al.*, 2003). The prediction that the depressed group would report poorer perceptions of sleep on the diary and life-quality/mood on the questionnaire than the control group was also confirmed. This is further evidence of the extent of sleep disturbance in depression, and vice versa (Benca *et al.*, 1992; Kupfer, 1995). Correlation of perceptions within the sleep diary and questionnaire, and between the diary and questionnaire, were generally high. This demonstrates the merit of combining the diary and questionnaire to quantify subjective reports of sleep and mood. The prediction that the relatives of the depressed group would be similar to the depressed group in the way that they report, and react to, subjective sleep and questionnaire perceptions was not demonstrated conclusively. There were trends that lend some support to these predictions, which may have been seen more clearly in a larger sample.

The results demonstrated that the depressed group reported significantly poorer perceptions of sleep on the diary and poorer perceptions of life quality and mood on the questionnaire than all of the other participants. Nevertheless, there were a number of inconsistent issues. The depressed group generally reported more, and longer, nocturnal awakenings than non-depressed participants, but these were not significant. The length of nocturnal awakenings appeared much longer, but was subject to wide variations, which may have reduced significance. This variance in the extent that participants estimate the length of nocturnal awakenings is in keeping with previous findings (Monk *et al.*, 1994); perhaps these perceptions are the most prone to subjective factors. The number of awakenings was not prone to these wide variations, and may not be sufficiently different between the groups. It would appear that the number of nocturnal awakenings is not crucial in the relationship between sleep difficulty and depression. It may be that all participants are aware that they wake during the night and that this does not adversely affect the perceived quality of sleep. On the other hand, depressed individuals wake for longer periods and perhaps ruminate on their problems, making the perception of sleep quality poorer.

The results suggest that the relatives of depressed patients did report, generally, poorer sleep perceptions than the controls and their relatives, lending some support to the predictions. This was not apparent for life-quality/mood perceptions. These relatives may well be demonstrating a tendency to report poorer sleep, but this is not reflected in their reports of mood, since they are not depressed. The similarity between the depressed group and their relatives, and the differences between these relatives and the other non-depressed

groups was also observed in the correlation analysis. The way in which depressed individuals' perceptions of total sleep time affected other sleep perceptions appeared to correspond with the relatives of depressed perceptions. Both groups showed a stronger association between total sleep time and other sleep perceptions than the control group and the 'relatives of control' group, while the control group and their relatives were similar in this respect. Sleep perceptions appeared to affect mood perceptions for the depressed group, but affected daytime weariness perceptions for the control group. This observation was not apparent between the relatives of depressed and the relatives of controls, or between the control group and the relatives of controls. This might suggest that poor sleep only affects mood for depressives, whilst for non-depressed individuals poor sleep results in feeling weary.

It is unlikely that total sleep time could represent a potential factor in identifying risk for depression. Whilst it appeared to pervade the sleep perceptions of the depressed group and their relatives, reduced sleep is found in many other psychiatric conditions (Benca *et al.*, 1997). It is more realistic to expect that a subjective perception of sleep that is related to reduced REM sleep latency and increased REM density (particularly in the first portion of sleep) would be more viable, since those objective factors are specific to depression (Kupfer *et al.*, 1990). The closest this study had to estimating reduced REM sleep latency was 'sleep quality in the first quarter' of sleep (SQF), in which the depressed group reported significantly poorer perceptions for this than the control group. However, the depressed group also reported significantly poorer perceptions of 'early' sleep quality than their relatives, whereas it might be expected they would be similar if this perception corresponds to the REM sleep abnormalities identified by Giles and her colleagues (Giles *et al.*, 1989, 1998).

The relatives of the depressed group reported poorer perceptions of early sleep than the other two non-depressed groups, but this was not significant. There is no way of being certain that a perception of 'early' sleep quality corresponds with reduced REM sleep latency, or increased REM density, without corresponding sleep EEG profiles to compare to. Another, objectively measured, sleep factor associated with depression is early awakening (Kupfer, 1995). It was anticipated that the subjective perception of 'late' sleep quality would measure this. The results showed a significant difference between the depressed group and controls for this factor, but were not different between any other group pairing. This suggests that subjective perception of 'late' sleep quality may reliably detect early awakening. However, these perceptions would need to be correlated with objectively recorded early morning awakening on sleep EEG to confirm this.

In summary, this study provides some evidence that the relatives of depressed patients might report, and react to, sleep disturbance in much the same way as depressed patients. This needs to be investigated in a larger sample. Further studies should address the relationship between subjective and objective measures in first-degree relatives; and examine whether these measures are predictive of depression at follow-up.

REFERENCES

Alapin I, Fichten CS, Libman E, *et al.* 2001. How is good and poor sleep in older adults and college students related to daytime sleepiness, fatigue, and ability to concentrate? *J Psychosom Res* **49**: 381–390.

Allen MG. 1976. Twin studies of affective illness. *Arch Gen Psychiatry* **33**: 1476–1478.

Beck AT, Ward CH, Mendleson M, Mock J, Erbaugh J. 1961. An inventory for measuring depression. *Arch Gen Psychiatry* **4**: 53–63.

Benca RM, Obermeyer WH, Thisted RA, Gillin JC. 1992. Sleep and psychiatric disorders: a meta-analysis. *Arch Gen Psychiatry* **49**: 651–668.

Benca RM, Okawa M, Uchiyama M, *et al.* 1997. Sleep and mood disorders. *Sleep Med Rev* **1**: 45–56.

Breslau N, Roth T, Rosenthal L, Andreski P. 1996. Sleep disturbance and psychiatric disorders: a longitudinal epidemiological study of young adults. *Biol Psychiatry* **39**: 411–418.

Cadoret RJ. 1978. Evidence for genetic inheritance of primary affective disorder in adoptees. *Am J Psychiatry* **135**: 463–466.

Clark-Carter D. 1997. *Doing Quantitative Psychological Research from Design to Report*. Psychology Press: Hove.

Ford DE, Kamerow DB. 1989. Epidemiological study of sleep disturbances and psychiatric disorders: an opportunity for prevention? *JAMA* **262**: 1479–1484.

Giles DE, Kupfer DJ, Roffwarg HP, *et al.* 1989. Polysomnographic parameters in first-degree relatives of unipolar probands. *Psychiatry Res* **27**: 127–136.

Giles DE, Kupfer DJ, Rush AJ, Roffwarg HP. 1998. Controlled comparison of electrophysiological sleep in families of probands with unipolar depression. *Am J Psychiatry* **155**: 192–199.

Guy W. 1976. *ECDEU Assessment Manual for Psychopharmacology.* DHEW ADM: Rockville.

Kendler KS, Neale MC, Kessler RCJ, Heath AC, Eaves L. 1993. The lifetime history of major depression in women. *Arch Gen Psychiatry* **50**: 863–870.

Kupfer DJ. 1995. Sleep research in depressive illness: clinical implications—a tasting menu. *Biol Psychiatry* **38**: 391–403.

Kupfer DJ, Frank E, McEachran AB, Grochocinski VJ. 1990. Delta sleep ratio: a biological correlate of early recurrence in unipolar affective disorder. *Arch Gen Psychiatry* **47**: 1100–1105.

Linkowski P, Kerkhofs M, Hauspie R, Susanne C, Mendlewicz J. 1989. EEG sleep patterns in man: a twin study. *Electroencephalogr Clin Neurophysiol* **73**: 279–284.

Mayers AG, van Hooff JC, Baldwin DS. 2003. Quantifying subjective assessment of sleep and life-quality in anti-depressant-treated patients. *Hum Psychopharmacol Clin Exp* **18**: 21–27.
Mendlewicz J, Rainer JD. 1977. Adoption study supporting genetic transmission in manic-depressive illness. *Nature* **268**: 327–329.
Monk TH, Reynolds CF III, Kupfer DJ, *et al.* 1994. The Pittsburgh sleep diary. *J Sleep Res* **3**: 111–120.
Partinen M, Kaprio J, Koskenvuo M, Putkonen P, Langinvainio H. 1983. Genetic and environmental determination of human sleep. *Sleep* **6**: 179–185.
Pires de Souza JCR. 1996. Quality of life and insomnia in university psychology students. *Hum Psychopharmacol Clin Exp* **11**: 169–184.
Rombaut N, Maillard F, Kelly F, Hindmarch I. 1990. The quality of life of insomniacs questionnaire (QOLI). *Med Sci Res* **18**: 845–847.
Webb WB, Campbell SS. 1983. Relationship in sleep characteristics of identical and fraternal twins. *Arch Gen Psychiatry* **40**: 1093–1095.
Williams JBW. 1990. *Structured Interview Guides for the Hamilton Rating Scales*. Springer-Verlag: Berlin; 48–63.

