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The Relationship between Weight Change and Sleep

A Study of Psychiatric Outpatients¹

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Introduction

This paper describes a small part of a research project which began about 7 years ago with the observation that patients with anorexia nervosa report a disturbance of their normal sleep pattern [Crisp, 1967]. This observation was subsequently confirmed in a systematic study of these patients in which early morning waking, as measured by patients' self-reports, nocturnal motility and all-night EEG recordings, was found to be closely related to weight change independent of mood [Crisp and Stonehill, 1971, Crisp et al., 1971]. Interrupted sleep was also a feature but not sleep disturbance at the beginning of the night. In a further study, obese subjects losing weight were found to sleep less, especially in the second half of the night, although this finding was less consistent [Crisp and Stonehill, 1970; Crisp et al., 1972].

A further study [Stonehill, 1972; Crisp and Stonehill, 1972; Stonehill and Crisp, 1972], part of which is described here, was designed to test a hypothesis that a relationship exists between changes in nutri-

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tional status and sleep patterns in a general psychiatric population. Although such changes in nutrition and sleep would be more common in some diagnoses, the relationship was hypothesized to span the range of psychiatric diagnoses. It was predicted that a relationship exists between total duration of sleep and weight change in the direction of weight loss and reduction of sleep as well as weight gain and increase in sleep; also between time of waking and weight change in the direction of weight loss and early waking, as well as weight gain and later waking. Furthermore, it was predicted that this relationship is closer than that between either of these characteristics and any one psychiatric diagnosis or feeling state.

Method

Questionnaires to be completed by the patient and on the basis of interviews were carefully designed and tested to seek information about the patient's sleep, weight and mental state in the time immediately preceding the present illness, in the weeks preceding attendance at the clinic and at the time of attendance. The study was designed in a way which sought to challenge the patient on areas of information possibly doubtful because of their subjective nature, and objective measures including weight and height were incorporated.

Consecutive new referrals to the psychiatric outpatient clinic of four consultant psychiatrists at a London teaching hospital were included in the study as far as possible (excluding subjects aged 17 years or less, pregnant women and shift-workers). In the first instances the questionnaire for completion by the patient was introduced in a standard way. Two questionnaires completed by interviewers were then administered consecutively. Both the order in which these were given and the order of allocation to the two interviewers were changed in a random way. Each interviewer, in this way, inquired only about sleep or about weight in any one patient. Measurements including weight and height were then made and the patient was then seen for the diagnostic interview by the consultant. Following this interview, the psychiatrist completed the last questionnaire providing a diagnostic profile together with other details of the patient's mental state.

Results

375 patients (172 male and 203 female) with a mean age of 34 ± 12 years were investigated.

The average sleep pattern during the illness was characterised by falling asleep later and shorter duration of sleep together with a greater

number and amount of sleep interruptions. Mean time of waking was unchanged, although there was considerable change in individual patients

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in one direction or another. Similarly there was no change in mean reported weight of the total population although individual variations were considerable, one-third of the population reporting weight change of 10 lb or more since the start of the illness. The population also rated itself significantly more tense, sad, angry, depressed and nervous than before the illness.

An intercorrelational matrix was prepared to include most items of data and, subsequently, intercorrelations between 30 items chosen to embrace the areas of sleep, nutrition and psychiatric state were submitted to a principle components analysis. The first 10 principle components were computed and none proved to be a major one. Five components contain high loadings in only one of the three areas of sleep, nutrition and psychiatric state. A further two components show a link between ratings of feelings and changes in sleep limited to the beginning of the night. The remaining three components (No. 3, 5 and 8) demonstrate a link between weight change and change in sleep, independent of mood state rated by the patient and the consultant and psychiatric diagnosis. Two of these components show an association between weight loss and decreased sleep, and the third between weight gain and increased sleep. Relationships between various aspects of sleep and various aspects of nutritional status in different psychiatric states were then explored by the formation and analysis of a series of 2x2 contingency tables. In the light of the traditionally held view of the association of both weight changes and sleep disturbance to affective disorders, psychiatric diagnosis in the areas of depression and anxiety and feelings of sadness were selected for examination, so that the relationship between aspects of nutrition and sleep could be examined in each of them. It is only possible to report the findings of a few of these analyses in this presentation. Table I shows a significant relationship between weight loss (in the last few weeks) and length of sleep of 6.5 h or less, and between weight gain and sleep of 7.5 h or more in each of the psychiatric states except the state of endogenous depression, in which numbers were small, and the state of no depression, in which there was a trend in the predicted direction. The link appears strongest in psychiatric states in which depression is diagnosed. Further analyses show that the association between weight change and sleep is mainly contributed to by time of waking in the morning. Broken sleep plays a part in states of depression and sadness but time of falling asleep

is not associated with weight change in any instance. The factor of age plays no part in the association. The ingestion or otherwise of psychotropic

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Table I. 2x2 contingency table. The relationship between length of time asleep in the last few weeks (interviewer questionnaire) and weight change in the last few weeks in different psychiatric states

drugs causing drowsiness and the presence or otherwise of symptoms of co-existent physical illness are factors which this study has attempted to assess because they are likely to have an impact on the duration of sleep. Table II shows that when these factors are taken into account, the link between duration of sleep and weight change remains in states of depression and sadness but not in the absence of depression. However, a relationship between weight change and duration of sleep becomes evident in the predicted direction in this latter category if change in the length of sleep between the weeks preceding attendance at the clinic and the time before the illness is taken into account (table III).

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Table II. 2x2 contingency table. The relationship between length of time asleep in the last few weeks (interviewer questionnaire) and weight change in the last few weeks in different psychiatric states in patients not taking drugs causing drowsiness and not suffering from co-existent physical illness

Table III. 2x2 contingency table. The relationship of change in length of time asleep between the last few weeks and before illness (interviewer questionnaire) and weight change in the last few weeks in patients not suffering from endogenous depression or neurotic depressive reaction who were not taking drugs causing drowsiness or suffering from co-existent physical illness

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Conclusions

The present study has shown an association between disturbed mood and time of falling asleep as well as between changes in body weight and time of waking. Other recently reported work has shown a link between immediate nutritional intake, nocturnal motility and sleep in the latter part of the night [Southwell et al., 1972; Brezinova and Oswald, 1972].

Whereas it is easy to understand that disturbed mood can contribute to difficulty in falling asleep, it is more difficult to conceive how a disturbance of feeling contributes to time of waking. Although, in the present study, the association between weight change and sleep was shown to transcend the psychiatric diagnoses and mood states, and usually operated in both directions, nevertheless the link varied between psychiatric states, being strongest in states in which depression and sadness were predominant. It may be that a component of depression and sadness such as, for example, a feeling of hopelessness, contributes directly towards time of waking. Other work has shown an association between agitation and time of waking in depressed patients [Hinton, 1963; McGhie, 1966], but these studies did not take weight change into account. At the present state of our knowledge, the mechanisms of the links both between nutritional state and sleep, and between psychiatric state and time of waking, remain unresolved.

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Total Time of Ocular Activity in the Course
of Rapid Eye Movement Sleep in Normal Subjects
and Mental Patients

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Introduction

The discontinuity of rapid eye movements (REM) in the course of the REM sleep periods (REMP) has led numerous authors to study this phenomenon quantitatively. The span in each REM, with and without REM has been determined. Temporal resolutions ranging from as long as 20 sec to as little as 1 sec were used by the various investigators doing such studies.

In the present work we compare the data obtained with the 20-sec resolution with those obtained with 1 sec resolution for measuring the time covered by REM activity in normal subjects and mental patients.