The relationship between Cornell Medical Index scores and attendance rates*

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MOST family physicians are familiar with the impression that certain families are 'consultation-prone', and that a relatively small percentage of patients are responsible for a disproportionately high percentage of all attendances. These excessive attendances are often associated with psychoneurosis, emotional disturbances, social problems, and intrafamilial conflicts (Kessel 1960). The difficulties in making an objective diagnosis of neurosis are well known, and the proportion of neurotics correctly identified depends on the experience of the doctor, his relationship with the patients, his attitude and definition of neurosis. Excessive attendances or 'thick-folders' are often sufficient to label the patient as 'neurotic' in the eyes of many less experienced doctors.

The Cornell Medical Index

The Cornell Medical Index (CMI) and its modifications have been extensively used as a simple and valid screening test or aid in the diagnosis of neurosis and emotional disturbances. The CMI first described by Brodman and his co-workers (Brodman *et al.* 1949), and summarized in the 1956 revision of the CMI *Manual* (Brodman *et al.* 1956), is a self-administered questionnaire consisting of 195 simply-worded questions arranged in 18 groups labelled A - R. It requires the marking of an answer of either 'yes' or 'no' to each question. A positive 'yes' indicates that the patient claims the symptom or complaint. Question groups A - L refer mainly to complaints related to body systems, whereas the groups M - R apply to emotional and psychological states, moods and feelings. By counting all positive responses, system scores (A - L and M - R) and total scores (A - R) may be calculated. As the subjects' responses are highly subjective, the value of the questionnaire in the identification of specific illnesses is limited. In subjects with emotional disturbances however, positive responses tend typically to be spread over many question groups, and to be especially concentrated in the M - R areas. The best indicator of neurosis or emotional disturbances appears to be the total (A - R) score, and when 30 is used as a 'cut-off' point, the test has given a specificity ranging from 74 per cent to 100 per cent in various studies (Abramson 1966a).

The survey—materials and methods

This survey examined the relationship between the CMI scores of married couples and the attendances of their family members at an urban family clinic in Herzlia, within the framework of the Kupat Holim Sick-fund (a system of pre-paid medical care) to test the hypothesis that high CMI scoring subjects and their children attend the doctor more frequently than low CMI scoring subjects.

'The family unit' was defined as: 'any married couple and their children registered

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on the same sick-fund registration number as the father, and living together in one living unit'. This definition excluded children over the age of 18 years, or residing outside the house, and also excluded elderly dependants. The study population comprised all those family units as defined, who were registered on the doctor's panel. Of the initial 454 family units, 17 transferred from the practice before the completion of the survey, and were excluded, as were six families from whom responses were not obtained. The remaining 431 family units were composed of 1,448 individuals out of a total practice population of 1,716. One hundred and thirty-three family units consisted of husband and wife, without children under the age of 18 years. 298 family units contained children, and of these, 134 represented complete nuclear families, while in the remainder at least one child was excluded by definition.

All attendances at the doctor and all house-visits were recorded for a period of six consecutive calendar months from 1 June 1966. Emergency calls at night or on week-ends, when a duty-doctor (not necessarily the author) is on call, were excluded, as a sub-sample of these calls revealed that in 95 per cent of cases only emergency treatment was administered, and the patient visited his doctor within two days for further treatment. CMI questionnaires (Hebrew translation) were distributed for completion by each husband and wife of the study population. A total of 30 or more positive responses was classified as a 'high' score, while less than 30, as a 'low' score. Married couples were also classified according to their paired scores (whether husband and wife were both 'high' or both 'low' scoring) into 'low', 'high', or 'mixed' scoring couples. An extensive search of pertinent literature failed to reveal the use of a similar classification based on the paired scores of married partners.

Results

Wives (table I). A significant direct relationship was demonstrated between the CMI scores of the wives and their attendance patterns and mean attendance rates. Among low scoring wives, the percentage of non-attenders (37 per cent) was more than three times as high as among the high scorers (11 per cent). The percentage who attended one to three times among low scorers (44 per cent) was nearly double that of high

TABLE I

PERCENTAGE DISTRIBUTION OF ATTENDANCES, AND MEAN ATTENDANCE RATES (HALF-YEAR) OF WIVES, IN RELATION TO THEIR CMI SCORES, AND TO THEIR PAIRED CMI SCORES

CMI scores	*Attendances (wives)*				*Total percent*	*Number in group*	*Rate per registered patient*	*Rate per attender*
	0	*1–3*	*4–5*	*6+*				
0–29	*37*	*44*	*14*	*5*	*100*	210	1·7**	2·7*
30+	*11*	*23*	*17*	*36*	*100*	221	4·9**	5·5*
H–W–[3] ..	*39*	*42*	*13*	*6*	*100*	178	1·6**	2·7*
H+W+ ..	*12*	*28*	*18*	*42*	*100*	117	5·4**	6·2*
H+W– ..	*28*	*53*	*16*	*3*	*100*	32	2·0	2·7
H–W+ ..	*11*	*44*	*16*	*29*	*100*	104	4·2	4·7
Totals ..	24	40	15	21	*100*	431	3·3	4·4

scorers (23 per cent). The percentage who attended four or five times was similar in both groups (14 per cent, 17 per cent), but the percentage who attended six or more times was seven times higher among high scorers (36 per cent) than among low scorers (5 per cent).

A similar significant relationship was demonstrated between the CMI scores of

the married couples (paired scores) and the attendance patterns and mean attendance rates of wives. Among low scoring couples, the percentage of non-attending wives (39 per cent) was three times as high as among high scoring couples (12 per cent). Respective percentages for those who attended one to three times were 42 per cent and 28 per cent. The percentage of wives who attended six or more times was seven times higher among high scoring couples (42 per cent) than among low scoring couples (6 per cent).

Among high scoring wives, the mean half-year attendance rates (as defined in footnotes to tables I and II) per registered patient (4·9) and per attender (5·5) were respectively three times and double that of low scorers (1·7, 2·7). Among high scoring couples also, these two attendance rates (5·4, 6·2) were 3·3 times and 2·3 times the respective rates among low scoring couples (1·6, 2·7).

The attendances of wives were statistically independent of the CMI scores of husbands, but in low scoring wives a trend was apparent to higher rates when the husbands were high scorers.

Husbands (table II). A similar significant direct relationship was also demonstrated between the CMI scores of the husbands, and their attendance patterns and mean attendance rates. The paired CMI scores of the couples, were also significantly related to the attendances of the husbands, and this relationship was statistically independent of the CMI scores of the wives. A trend was however apparent in the husbands towards higher or lower rates when married to high or low scoring wives respectively.

TABLE II

PERCENTAGE DISTRIBUTION OF ATTENDANCES, AND MEAN ATTENDANCE RATES (HALF-YEAR) OF HUSBANDS, IN RELATION TO THEIR CMI SCORES, AND TO PAIRED CMI SCORES

CMI scores	*Attendances (husbands)*				*Total percent*	*Number in group*	*Rate per registered patient*[1]	*Rate per attender*[2]
	0	*1–3*	*4–5*	*6+*				
0 –29	*37*	*48*	*8*	*7*	*100*	282	1·7**	2·7*
30+	*17*	*39*	*14*	*22*	*100*	149	3·5**	4·2*
H–W–[3] ..	*40*	*48*	*7*	*5*	*100*	178	1·5**	2·5*
H+W+ ..	*16*	*48*	*14*	*22*	*100*	117	3·5**	4·1*
H+W– ..	*19*	*40*	*13*	*28*	*100*	32	3·5	4·3
H–W+ ..	*30*	*50*	*10*	*10*	*100*	104	2·0	2·9
Totals ..	*30*	*48*	*10*	*12*	*100*	431	2·3	3·3

References for tables I and II

[1] Rate per registered patient—Total number of attendances, divided by the number of individuals registered in the study population (attenders+non-attenders).

[2] Rate per attender—Total number of attendances divided by the number of individuals who attended at the doctor during the survey period (excluding non-attenders).

[3] H–W–: Husband with low CMI score, wife with low CMI score.
H+W+: Husband with high CMI score, wife with high CMI score.
H+W–: Husband with high CMI score, wife with low CMI score.
H–W+: Husband with low CMI score, wife with high CMI score.

* Differences statistically significant at $P<0·01$.

** Differences statistically significant at $P<0·001$.

Children (tables III and IV). The 586 children of the study population were divided into four age groups so as to standardize for differences in attendance rates at different ages (Polliack 1969). Among the 410 children under the age of 12 years, the percentage of non-attenders and the attendance rates were demonstrated to be related to the CMI

TABLE III

PERCENTAGE OF NON-ATTENDERS, AND MEAN ATTENDANCE RATES (HALF-YEAR), OF CHILDREN AGED 0 – 5·9 YEARS, IN RELATION TO CMI SCORES OF THEIR FATHERS, CMI SCORES OF THEIR MOTHERS, AND PAIRED CMI SCORES OF THEIR PARENTS

CMI scores	*Aged 0 – 1·9 years*				*Aged 2 – 5·9 years*			
	Percent of non-attenders	*Rate per registered child*	*Rate per attender*	*Number in group*	*Percent of non-attenders*	*Rate per registered child*	*Rate per attender*	*Number in group*
Father 0–29	*19*	4·6**	5·7	42	*21*	3·5*	4·4	110
Father 30+	*16*	7·0**	8·3	19	*10*	5·6*	6·3	48
Mother 0–29	*15*	5·0	5·9	33	*23*	3·1*	4·0	91
Mother 30+	*21*	5·7	7·3	28	*10*	5·5*	6·2	67
H–W– ..	*17*	4·6	5·5	29	*25*	3·0**	4·0	77
H+W+ ..	*20*	6·6	8·3	15	*9*	6·4**	7·0	34
H+W– ..	*(0)*	(8·3)	(8·3)	(4)	*14*	3·7	4·3	14
H–W+ ..	*23*	4·7	6·1	13	*13*	4·7	5·3	33
Totals ..	*18*	5·3	6·5	61	*18*	4·1	5·0	158

* Differences statistically significant at $P<0·01$. ** Differences statistically significant at $P<0·001$.

TABLE IV

PERCENTAGE OF NON-ATTENDERS, AND MEAN ATTENDANCE RATES (HALF-YEAR) OF CHILDREN AGED 6–18 YEARS, IN RELATION TO CMI SCORES OF THEIR FATHERS, CMI SCORES OF THEIR MOTHERS, AND PAIRED CMI SCORES OF THEIR PARENTS

CMI scores	*Aged 6–11·9 years*				*Aged 12–18 years*			
	Percent of non-attenders	*Rate per registered child*	*Rate per attender*	*Number in group*	*Percent of non-attenders*	*Rate per registered child*	*Rate per attender*	*Number in group*
Father 0–29	*32*	1·7**	2·6	115	*45*	1·1	2·0	109
Father 30+	*25*	2·6**	3·5	76	*31*	1·4	2·0	67
Mother 0–29	*38*	1·6*	2·6	86	*42*	1·2	2·1	73
Mother 30+	*22*	2·4*	3·1	105	*38*	1·3	2·0	103
H–W– ..	*38*	1·5***	2·4	73	*45*	1·1	2·0	58
H+W+ ..	*22*	2·6***	3·3	63	*31*	1·4	2·1	52
H+W– ..	*38*	2·6	4·3	13	*33*	1·5	2·2	15
H–W+ ..	*21*	2·2	2·8	42	*46*	1·1	2·0	51
Totals ..	*29*	2·1	2·9	191	*40*	1·2	2·0	176

* Differences statistically significant at $P<0·05$. ** Differences statistically significant at $P<0·02$.
*** Differences statistically significant at $P<0·01$.
Rates per registered child and per attender, as defined in tables I and II.

scores of their fathers, their mothers and also to the paired CMI scores of the couples. The percentage of non-attenders was consistently lower and both attendance rates were consistently higher among the children of high scoring fathers, mothers or couples, than among low scoring parents. Noteworthy however, was the marked relationship

of childrens' attendances with the CMI scores of their fathers, especially in the 61 children under the age of 2 years.

Among the 176 children over the age of 12 years, no significant relationship was apparent between their attendances and the CMI scores of either parent. Noteworthy again, was the trend towards a lower percentage of non-attenders and towards higher attendance rates among the children of high scoring fathers.

Discussion

The significance of the results of this survey requires cautious interpretation. It is well known that the CMI scores of men and women are related to many factors. High scores appear to be more prevalent in subjects over the age of 40 years (Abramson 1965, 1966b), in the lower social classes (Abramson *et al* 1965), and in recent immigrants (Srole 1962, Kark *et al.* 1963). The influence of these factors on the CMI scores of the study population was confirmed in an extension of the present study, in which, in addition, a direct significant relationship was also demonstrated between the CMI scores of husbands and wives (Polliack 1969). The validity of the CMI in different culture groups has been questioned (Brodman, *et al.* 1952; Abramson 1966a), but ethnic group does not appear to be a differentiating factor in Israel (Abramson 1966b) nor in the study population (Polliack 1969).

Many studies have demonstrated the validity of the CMI as an indicator of general health state (Brodman *et al.* 1952), mental health rating (Brodman *et al.* 1952), work absenteeism (Erdmann *et al* 1953), overall functional capacity (Steindhardt *et al.* 1953), psychoneurosis (Brown and Fry 1962), and emotional health (Abramson 1966b). The CMI has also been used in the study of familial factors affecting emotional disorders, e.g. the presence of neurosis in married couples (Ryle and Hamilton 1962), neurosis in mothers and their daughters (Abramson 1960), inter-generational culture conflict within the family (Abramson 1961), and social and psychological factors (Hamilton *et al.* 1962, Ryle and Hamilton 1962, Pond *et al.* 1963, Abramson 1966b). The relatively high prevalence of high CMI scores found among wives (51 per cent) and husbands (35 per cent) in the study population may be associated with a predominance of many of the above factors. A further important factor may be the doctor's known interest in the psychological aspects of medical care which has probably resulted in a bias in the composition of the panel of patients by self-selection over the years, resulting in a relatively high proportion of multi-problem families under his care.

The relationship between the CMI scores of both parents and the attendances of their children, probably demonstrates the significance of both parental rôles as affecting the health-orientated behaviour of parents towards their children, and towards the utilization of the available health service. It is significant that after the age of 12 years, all relationship between the attendances of the children and the CMI scores of either parent ceased, implying the assumption by the child of a more independent rôle. The unexpectedly close relationship demonstrated between the attendances of the children and the CMI scores of their fathers, especially in those children under the age of 2 years (where the relationship was closer with the father's score than with the mother's score), must be interpreted with caution because the numbers in each group were small. Medalie and others (personal communication) in a Jerusalem practice demonstrated that the adult members of patriarchal families of North African origin were apparently more affected by the deaths of their fathers than by the deaths of their mothers, as reflected in their use of the medical service. Thus the relationship with the fathers' CMI scores shown in the present survey, may be due to a statistical aggregation of children of this specific ethnic origin. There is a need for further study and investigation of this interesting finding, because, if valid it may have implications on the importance of the father's rôle in child-rearing behaviour and health practices within the

family unit at all ages and especially under the age of 2 years.

The attendance rates calculated in this survey, are lower than those found in most Kupat Holim clinics (personal communication 1962); but the mean attendance rates during six months cannot be exactly equated with half the annual attendance rate, and this limits statistical comparisons. In addition, the exclusion of all single men and women, children over the age of 18 years, and elderly dependants from the study population limits comparison with other studies on attendance rates in family practice. All attempts to express the attendances of the family unit by a single 'family attendance rate' were unsuccessful, because of difficulty in including childrens' attendances which have different significance at different ages, according to the number of siblings, the birth rank of the child, and other well-known factors. It is possible that certain adults with high CMI scores and low attendance rates to the family doctor, actually attended excessively with their children as presenting symptoms. Conversely, low attendance rates among children of high scoring parents, may have been associated with high attendance rates among their parents to the family doctor. This survey did not provide answers to these possibilities. The validity of a 'cut-off' point of 30 for differentiating between high and low CMI scores in both men and women, was supported by marked changes in attendance rates at this point (Polliack 1969).

Many surveys have shown that the attendance rates of patients at their doctors are influenced by many factors and not only by the presence of disease (Balint 1968). Higher attendance rates are often recorded in patients over the age of 40 years, in women, in lower social classes, in recent immigrants and in certain ethnic groups. The influence of these factors on the attendance rates of the study population was confirmed in an extension of the present survey (Polliack 1969). None of the factors discussed are sufficient to account for the vast differences in the attendance rates associated with high and low CMI scores as demonstrated in this survey. The presence of additional factors must be assumed in order to explain their inter-relationship.

Hinkle and his co-workers (1958) have shown that when persons perceive their life situations as stressful, they tend to suffer from illnesses of all types and causes, and from non-specific diffuse symptoms which may reflect on their use of medical services. Many authors consider that excessive attendances at the doctor are associated with psychoneurosis, emotional disturbances, social problems, and intra-familial conflicts and crises (Watts 1956, Kessel 1960, Brown and Fry 1962, Ryle and Hamilton 1962, Grad and Sainsbury 1963, Balint 1968, Yeshurin-Berman 1968). Emotional health is compounded of numerous socio-psycho-somatic factors in the patient and in the marriage partner—factors which are extremely difficult to measure even after extensive and time consuming psychological assessments by trained and experienced personnel.

The CMI is a useful indicator of emotional health (Abramson 1965, 1966b) and has been accepted as a measure of the subject's own perception of his health state (Abramson 1966a). This perception has a profound influence on the subject's health-orientated behaviour, on his attitudes, and on his utilization of the health service. It is suggested that the emotional, behavioural, and cultural factors which together with other variables discussed above, serve to complete the inter-relationship between the CMI scores and attendance rates as demonstrated in the survey.

This survey has attempted to measure the effect of neurosis and 'multiple complaints' of parents on their attendances, and on the attendances of their children. It has also demonstrated the use of the CMI Health Questionnaire in a family practice, as a self-administered screening test which, with minimum time expenditure and without the need for specialized training, may help to identify many of those families whose members are responsible for a disproportionately high percentage of attendances at the doctor. Investigation of these families by the primary medical-care team, and the appropriate treatment of their comprehensive problems, rather than of the presenting problem only,

could have far reaching implications on the attendances and on the work loads at the family doctor.

Summary

This survey examined the relationship between the Cornell Medical Index (CMI) responses of 431 married couples, and the attendances of their family members at an urban clinic, within a system of pre-paid medical care. Among both husbands and wives, the attendance patterns, the percentage of non-attenders, and the mean attendance rates per registered patient, and per attender, were significantly related to the CMI scores of the patient, and to the paired CMI scores of the married couples. Attendance rates were significantly higher in those husbands and wives with high CMI scores (30 or more).

A similar relationship was demonstrated between the attendance rates of children under the age of 12 years, and the CMI scores of their parents, but not in children over the age of 12 years. An unexpected finding was the close relationship between the attendance rates of children under the age of 2 years, and the CMI scores of their fathers.

The significance of these findings is discussed with reference to other factors which are known to be related to CMI scores and attendance rates. It is suggested that the emotional, behavioural, and social factors reflected in the CMI scores, in addition to the other variables discussed, serve to complete the inter-relationship demonstrated between the CMI scores and attendance rates. The implications of these findings on the attendances and work loads at the family doctor are discussed.

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