

PSYCHIATRIC AND ELECTRO-ENCEPHALOGRAPHIC STUDIES IN SOCIALLY ADJUSTED OLD PEOPLE

By

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IN earlier studies from this department (Robinson, 1955; McAdam and Robinson, 1956) it was shown that in senile and arteriosclerotic deterioration a correlation existed between the degree of deterioration assessed clinically and the amount of abnormal low frequency activity observed in the EEG. The relationship had for the first time been quantitatively demonstrated, but we had no precise knowledge of the EEG or clinical profiles presented by a group of "normal" old people. In our hospital patients, the amount of deterioration extended over a very wide range, from mild forgetfulness to severe dementia.

The series to be described in this paper was one in which we believed that in neither dimension of measurement (clinical or EEG) would gross abnormalities be likely to occur. If it could be shown that they were in fact rare, some validation would be given to the pathological assessments we had devised. Further, if they were of approximately equal rarity in the clinical and EEG dimensions, and if their occurrence tended to coincide in the same subjects, further support would be given to our belief in the quantitative relation between them. With these hypotheses we approached the present study.

MATERIAL

Our subjects were drawn from a local Old People's Club. We relied on volunteer subjects, as a random sample would have been difficult to administer; partly because of the relatively small population to which we had access, and partly because a fear of being associated with the mental hospital might have deterred many of our subjects. The relatives and friends of our volunteers regarded them as "normal" old people. Colleagues who carried out parallel studies found them to be a reasonably homogeneous group in respect of activity, intelligence, and social and economic status. Some of this work has been published (Orme, 1957), and another paper is in preparation, and we will not therefore comment further on these aspects of our case material at this stage.

METHOD

Our methods of EEG and psychiatric examination have been described (Robinson, 1955; McAdam and Robinson, 1956). The EEGs were reported in the course of routine hospital and out-patient diagnostic sessions, and they were there and then briefly described and assessed as normal, borderline or abnormal. The criteria of abnormality used here is that published by Hill and Parr (1950). The EEG reporter (W.M.) had no access to the subjects or to the case notes.

There was no opportunity for detailed physical examination, and as we had no control over the selection we had to accept many subjects who had manifest physical disabilities. These included, for example, evidence of cerebral damage, such as hemiplegias and dysphasias; and had we been making our own selection, many such subjects would have been excluded, in view of the fact that focal cerebral disease, and certain systemic diseases, can modify both the EEG and the intellectual performances. We had no reliable information as to the nature of the relationship between EEG and intellectual abnormalities in such cases, though Wiener and Schuster (1956) have shown that a relationship exists.

FINDINGS

On the psychiatric rating scale almost all the subjects did well. Out of our total of 55, 37 achieved a score of 16 or above on the scale; whereas in our hospital series of 50 patients, only 2, similarly tested, scored so well. The rating scale was, of course, designed for deteriorated patients. In the present series, those who scored 16 or over were considered "not deteriorated" and no attempt was made to sub-divide this group.

In those EEGs which showed abnormality, none showed enough to justify their being given a grading below that of the "mild" group of our preliminary study (Robinson, 1955). In all, 15 records were considered to show definite though slight abnormalities.

In those 37 who were "not deteriorated", abnormal EEGs were found in 6, and physical disabilities were noted in 14. These included mild and controlled diabetes mellitus (4) and healed coronary artery disease without symptoms (2). In these the EEG was normal. There was 1 mild degree congestive heart failure with a borderline EEG and 3 with intermittent claudication, 2 with a normal and 1 with a borderline EEG. There were 6 cases with more manifest cerebral involvement—4 with hypertension and attacks of giddiness, of whom 2 had abnormal EEGs and 2 who had hemiparesis and "blackouts", both having abnormal EEGs.

In the "slightly deteriorated" group of 18 subjects, physical disabilities were noted in 7, and abnormal EEGs in 9. In 3 with hypertension and giddiness, EEG abnormalities were noted in each. In 2 with dysphasia, 1 had an abnormal EEG. The remainder were 1 of Parkinsonism, with an abnormal EEG, and 1 of congestive heart failure, with a normal EEG.

Thus, out of 21 in whom physical disabilities were noted, there were 11 in whom there were strong grounds for believing that there was organic cerebral involvement, and in 8 of these the EEG was abnormal. The proportion of cases with suggestive or manifest indications of cerebral involvement was almost twice as high in the group which showed intellectual impairment as in the intellectually normal group—28 per cent. and 16 per cent. respectively. In the other physical disabilities noted, the EEG was normal except in 1 of congestive heart failure which was borderline.

No consistent pattern of EEG abnormality could be found to correlate with the physical disabilities. There were cases of polyrhythmic dysrhythmia: of "slowed alpha" of 7 c.p.s.: of localized and of generalized abnormality. The poor information that we possess on the physical health of our subjects would in any case make it unprofitable to attempt a close correlation with the EEG. Whether or not the EEG patterns can show any correlation with other

modalities including psychological test material will be the subject of a further communication.

The following table summarizes the relationships between the EEG and the clinical scores:

Table Showing Distribution of EEG Categories Between "Not Deteriorated" and "Deteriorated" Subjects in the Whole Series, and the Same (in brackets) when Subjects with No Significant Physical Disability are Excluded

		Clinical Score				16 and Over	Less than 16
EEG	Normal	..	..	..	..	28 (15)	6 (2*)
	Borderline	..	..	..	..	3 (2)	3 (1)
	Abnormal	..	..	..	..	6 (0)	9 (4)

* Excludes also 3 who refused the serial sevens test, which we thought (R.A.R.) they were capable of performing adequately.

It can be seen that for the whole series there is grouping of normal EEGs with "not deteriorated" subjects and of abnormal EEGs with the "slightly deteriorated". Applying the χ^2 formula we get a probability of less than 1:100 that this relationship might occur by chance. When significant physical diseases are excluded we get a considerably better grouping of the same order. We cannot, however, attach much weight to the latter, in view of the sophistication of the selection and rejection for this group and of our necessarily imperfect information on the disabilities that led to rejection.

Using Student's t test we found no significant difference in the mean ages of the two clinical groups. The average age of the "not deteriorated" group was 69; and of the "deteriorated", 70.5.

Our findings support the views that in old age the early appearance of intellectual impairment can be expected to accompany minor signs of abnormality in the EEG; and the presence of a normal EEG greatly diminishes the probability that any intellectual impairment of senile-arteriosclerotic type is present.

DISCUSSION

Our findings supplement those of our earlier studies which led us to conclude that increasing signs of intellectual deterioration in old age are accompanied by increasing abnormalities in the EEG. Mengoli (1952) noted that in "normal" subjects great age could be reached without any sign of EEG alteration, while in subjects with brain diseases, the distribution of EEG patterns was most irregular, the same disease being accompanied in one case by a normal and in others by varied patterns of abnormal EEG. Obrist (1954) used as criteria of normality that the subjects were ambulatory, non-hospitalized and non-psychotic. He found that the outstanding characteristic of the EEG in normal old age is a slowing down of the alpha rhythm and a slight increase in the incidence of delta wave activity. It will be noted that all the individuals in our present series were "normal" according to these criteria: and that a different concept of "normality" leads to the elucidation of relationships otherwise obscured. Similar comment applies to the paper by Mundy-Castle and his associates (1954), who studied 50 "mentally normal seniles" defined as showing "no considerable disturbances of memory, orientation or coherence of thinking". In this group they found that 24 per cent. possessed abnormal EEGs. Silverman *et al.* (1955) found relationships between the EEG and age, socio-economic level, and evidence of organic deterioration, such as perseveration of speech and poverty of ideas. Subjects showing these signs had records

with mixed and diffuse abnormalities. There tended to be greater numbers of abnormal records in succeeding decades, and less in higher socio-economic groups. However in a later paper (Busse *et al.*, 1956) in which a larger community group was studied in more detail, the use of Wechsler Intelligence Scales and the Fischer Maladjustment Scale derived from Rorschach data failed to differentiate between EEG groups. Maggs and Turton (1956) considered a group of persons over 60 and leading a normal home existence. These were controls for a group of elderly subjects suffering from affective disorder subdivided into two groups according to whether the age of onset was below or above 60 years. They found no definite difference in record type between the three groups; and concluded that "both the borderline records and those with an excess of slow activity should be largely neglected in assessing the prognosis of any individual case . . . and are not in fact causally related to either an involuntal depression or an early organic dementia".

None of these authors produces information which supports our conclusion. It is to be noted that the concept of "normality" has not been used by us in categorizing our cases. We were obliged to accept the term as it was used by our volunteers, in the reasonable assumption that it would imply considerably better levels of ability to adapt to society out of hospital than was found in our earlier cases, who were admitted because such adaptation had broken down. We assumed also that in those who were still able to adapt, out of hospital, there might be different levels of ability; and our clinical rating scale is an admittedly crude device for obtaining a numerical rating for such level of ability. It appears to us that the findings of the authors referred to above are not in disagreement with ours; but merely that our use of an additional scale of measurement has permitted us to extract more information from comparable material.

SUMMARY

Fifty-five volunteers from an Old People's Club were subjected to psychiatric and EEG examination. In thirty-seven there was no evidence of intellectual impairment. In fifteen there were signs of a very minor degree of impairment. There were thirty-four who had normal EEGs and fifteen who had abnormal EEGs. The distribution of psychiatric and EEG normality and abnormality was found to correlate significantly.

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